

CURRENT PRACTICES AND
MARKET DEMAND POTENTIAL FOR
COMPOST PRODUCED BY SMALL TO
MID-SIZED FARMS IN MICHIGAN:
A MARKET RESEARCH REPORT

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1. EXECUTIVE SUMMARY

Farmers in Michigan cannot apply manure to fields exceeding 300 pounds of soil phosphorus/acre and meet Michigan Right-To-Farm guidelines. Land application of manure is currently the primary method farmers use to utilize manure nutrients produced on the farm. Removing this option means farmers have to utilize manure nutrients some other way. Farmers have expressed a strong interest in identifying and determining the viability of alternative sustainable manure treatment methods, especially composting, to help them manage manure that can no longer be land applied. This compost market assessment report is a direct result of that interest.

Very little is known about the dynamics of compost markets in Michigan because there has never been a compost market assessment performed in the state. This report presents the findings of a study on compost markets in Michigan conducted in the spring of 2004. Over a thousand respondents - 276 landscape firms, 311 nurseries and 437 farmers - returned completed surveys with usable information. A summary of the survey results is as follows:

1.1. Compost Demand Potential

1. Cost of green waste disposal by landscapers and nurseries is \$30 million annually. This is true even though landscapers generate nearly one million cubic yards of compost using their own green waste, while nurseries generate 151,000 cubic yards for a total of about 1.1 million cubic yards of compost production within these two sectors.
2. Two-thirds of landscapers indicate interest in purchasing compost, while interest is reflected by about half of nurseries and a slightly lower proportion of farmers. Total demand potential among these three sectors is estimated at 200 million dollars annually or 17 million cubic yards. Of this, nearly 90 percent of the demand potential is in the agriculture sector.

1.2. Landscape Firms

3. About half of Michigan's 9,000 landscape firms generate green waste in their operations, at an average of about 700 cubic yards annually. Cost of disposal averages about \$6,100 per firm. Just over half of green waste generators currently make their own compost and they produce an average of about 380 cubic yards.
4. Over one-third of landscapers are compost users and their average annual usage is about 250 cubic yards. The majority prefer to purchase their compost in bulk, rather than bag. While spring is the single most popular time of year for compost use, compost is also used extensively in other seasons.
5. The most popular usage applications of compost are as soil amendment and as mulch on new and existing installations of planter beds and around trees. Use of compost as a topsoil component to improve soil health is another popular application. Over a third of landscapers intend to increase their use of compost.
6. The three most important product specifications for compost are consistent product quality, no offensive odors and nutrient availability. Material grade and color are the least important.

7. Over 60 percent of landscapers indicate interest in using compost purchased from an external source. Average price they are willing to pay is \$11.60 per cubic yard.
8. Landscapers that produce their own compost believe it to be of satisfactory quality. On average, landscapers have a higher potential demand than they produce each year. It is important to note however, that landscapers fear quality variances if they purchase from external sources. Landscapers feel that producing compost for sale would not be economical for them.
9. The educational program of greatest interest to landscapers is compost application and use.

1.3. Nurseries

10. Nearly sixty percent of Michigan's nurseries generate green waste, at an average of about 364 cubic yards annually. Cost of disposal averages about \$2,245 per firm. About half of the green waste is composted on site.
11. Three-quarters of nurseries are familiar with compost and about half currently purchase premixed media. The most popular elements of the mix are hardwood, field soil, peat and pine bark.
12. The majority of nurseries believe that producing compost for sale is not economical. They would consider using compost if the economic benefits could be demonstrated.
13. The three most important product specifications were nutrient availability, consistent product quality and pH. It should be noted however, that twelve product specifications related to quality were roughly equal in importance. The aesthetic properties of the compost, such as material grade and color, are the least important specifications.
14. Nearly half of landscapers indicate interest in using purchased compost product. Average price they are willing to pay is \$12.17 per cubic yard. One in five say they expect to increase their use of compost.
15. Educational programs of greatest interest are compost application and use followed by composting methods.

1.4. Agriculture

16. Thirteen (13) percent of Michigan's 9,200 larger farmers (those represented in this study) currently are compost users. Two-thirds purchase their compost in bulk.
17. The three most important product specifications are cost/quality relationship, pH and nutrient availability.
18. On the average, farmers are willing to pay \$12.10 per cubic yard for purchased compost. Price ranks third as an obstacle, behind availability and product knowledge factors.
19. About four in ten farmers estimate they would use an average of 10.5 cubic yards of compost per acre. Nearly one in five said they intend to increase their use of compost.

20. Farmers believe that producing compost for sale is not economical for them but they would consider using more compost if the economic benefits could be demonstrated. They do not know much about composting, including the economic issues. They do not consider compost to be their primary nutrient source.
21. The educational program of greatest interest is compost application and use.

2. ACKNOWLEDGEMENTS

The genesis for this project rose from the powerful feelings and attitudes expressed to the author by many farmers when they realized, while completing a Manure Management Systems Plan, they did not have enough land base to apply all the manure nutrients generated on their farms. Addressing these feelings and attitudes has been a strong motivating force behind this project.

Many organizations believed in this project and provided financial support for it. The author wishes to thank Allegan County Farm Bureau, The Frey Foundation, Hamilton Farm Bureau, Muskegon County Farm Bureau and Ottawa County Farm Bureau for providing sufficient matching dollars to secure a USDA Federal-State Marketing Improvement Program (FSMIP) grant through the Michigan Department of Agriculture. Additional financial support was obtained through the Michigan Horse Council, Michigan State University, the Michigan State University Extension Manure Management Team and a Michigan Sustainable Agriculture, Research and Education grant.

The author also gratefully acknowledges the many valuable contributions of a steering committee made up of farmers and consultants. The farmers on the committee own or are partners in small to mid-sized farming operations and also produce compost on their farms. This committee was formed in the beginning of the project and was given the charge to make the project relevant to small and mid-sized livestock producers. Committee members were Mike Bronkema (poultry), Joel Bussis (poultry), Brandon Hill (consultant), Rose Lindberg (dairy), Christopher Lufkin (consultant), Rob McCartney (horticulturalist), Pete Moolhuizen (rabbit), Bill Oomkes (landscaper), Dirk Pyle (poultry), Denny and Gail Sikkenga (dairy), Bill Stough (consultant) and Fred Walcott (poultry and swine). Their insights were incorporated into how the survey instrument was constructed and what questions were most important to ask. Valuable input was also received and implemented as the survey instrument was being developed from Dr. Murari Suvedi, Professor, Department of Community, Agriculture, Recreation and Resources Studies, Michigan State University.

Over the years the author has realized how valuable, yet often unappreciated, administrative assistants are in the success of a given project. The author wishes to thank Chris Adamovich, who went above and beyond the call of duty to get the survey data entered (even employing the talents of her husband Louis).

Finally, the author wishes to thank William (Bill) A. Stough, CEO, Sustainable Research Group for providing project strategic and management services and Frederick (Fred) D. Howell, Principal, Millennium Research Group, Ltd. for providing technical survey development and interpretation support. Without their guidance this project wouldn't have happened. Both contributed heavily to the writing of this report. Gratitude is also expressed to Bernardo Lopes Ariza, Nirmal Subedi, and Shriniwas Gautam, graduate students in the Department of Community, Agriculture, Recreation and Resources Studies, Forestry and Agricultural Economics, respectively, Michigan State University for their work in providing survey data results and interpretation.

3. PROJECT OVERVIEW

3.1. Background Information

People have identified the West Michigan area as a desirable place to live and visit because of the abundance of high quality-of-life opportunities. According to the 2000 census, one county in this region, Ottawa County, experienced the largest population growth of all counties in Michigan over 200,000 in population (Knudsen, 2001). Two state parks within Ottawa County, Grand Haven State Park and Holland State Park, consistently rank either number one or two in the same Michigan Department of Natural Resources district each year for numbers of visitors. West Michigan has a large livestock and poultry industry (Klewano and Matthews, 2003). Ottawa County is the number one agriculture county in the state with almost \$300 million in direct farm receipts annually. Ottawa County is ranked in the top 100 counties in the United States for market value of goods sold (88th). Farming generates \$278 million dollars in gross sales, \$165 million in crops and \$113 million in livestock (USDA-NASS, 2003). The majority of farms in the county are small to mid-sized operations and are still family owned and operated. The county has a very diverse agriculture industry, ranging from u-pick fresh fruits and vegetables to veal to Christmas trees to commercial fish fillet production.

As a result of people moving into or visiting the region, conflicts between agriculture and the non-agriculture community have rose over odor and water quality issues. In 2001, Ottawa County was ranked second in the state with 11 complaints for farm-related environmental complaints reported in the 2004 Michigan Right to Farm Annual Report. Three other West Michigan counties, Allegan, Barry and Kent, had between 5-8 complaints each. Air and surface water quality concerns top the complaint list. In 2004, Allegan and Ottawa counties had six complaints each. Lake Macatawa, a lake that straddles the Ottawa County and Allegan County border, made the state's 303(d) list. Lake Macatawa is on this list because it does not meet the water quality standards required by the federal Clean Water Act. To address water quality concerns, a Total Maximum Daily Load (TMDL) watershed project was started to reduce the lake's phosphorus levels from 126,000 lbs/year to 35,000 lbs./year by 2009. It is estimated that 68% of the watershed is cropland (Macatawa Watershed Project Description, 1998). Implementing agricultural Best Management Practices play a significant role in reducing the lake's phosphorus levels.

During the winter of 2001-2002, Michigan State University (MSU) Extension sponsored a series of small-group workshops to assist farmers in West Michigan to develop Manure Management Systems Plans (MMSP) (see Michigan Commission of Agriculture reference). These plans helped farmers comply with Michigan Right-To-Farm guidelines, maximize nutrient use by growing crops, cut commercial fertilizer expenses and reduce the potential for pollution to the waters of the State. Farmers indicated their manure management skills, knowledge and confidence increased as a result of attending these workshops (Gould, 2002).

One of the outgrowths of completing these plans was the realization by farmers that they could no longer apply manure to fields exceeding 300 pounds of phosphorus/acre and meet Michigan Right-To-Farm guidelines. Land application of manure is currently the primary method farmers use to utilize manure produced on the farm. Removing this option means farmers have to utilize manure nutrients some other way. Farmers expressed a strong interest in identifying and determining the viability of alternative sustainable manure treatment methods, especially composting, to help them manage manure that can no longer be land applied. This compost market assessment report is a direct result of those expressions for assistance.

Producers are interested in composting for many reasons; however, the most appealing reason is the potential for a new source of farm income. Notwithstanding this fact, few producers are currently

composting, primarily because of the lack of identified markets prepared to receive compost. No compost market assessment has ever been completed for Michigan. Until potential markets are identified, producers are unwilling to invest their time and money in something that may not give them a return for their efforts.

3.2. Uses for Assessment Results

There are two ways the assessment results will be used. First, farmers can use the results to develop their own individual compost marketing plans. Second, a farmer cooperative could explore the feasibility of a regional facility that composts manure and agricultural by-products for those markets. Support for examining the feasibility of a regional composting facility is found in a paper entitled “A Comparison of Static Pile and Turned Windrow Methods for Poultry Litter Compost Production” in *Compost Science & Utilization* (2000) which states that “a production scheme where poultry manure is static pile composted on farms for later transport to regional processing centers appears feasible.” Additionally, a soon-to-be released regional composting facility feasibility study report conducted in Wisconsin’s Fox River Valley concludes that a regional composting facility will cash flow (Holtz, 2003). A regional composting facility would help move large volumes of nutrients (primarily phosphorus) out of West Michigan. Both options provide an additional source of income to area farm families and demonstrate responsible use of nutrients found in manure and agricultural by-products.

3.3. Justification for Project

To gain these benefits however, first requires the completion of a compost market assessment. Nothing is known about compost markets in Michigan because there has never been a compost market assessment performed in the state. Until an assessment is completed and potential markets identified, farmers are unwilling to invest their time and money in a composting facility, either on-farm and/or regional, that may not provide them with the economic, social and environmental benefits they are seeking.

3.4. Goal and Objectives

Goal: Move small to mid-sized Michigan farmers towards becoming more sustainable by identifying potential markets for composted manure and agricultural by-products.

Objective 1: Conduct a literature search for completed compost markets assessment reports from other states.

States with completed compost market assessments will provide the template for the creation of Michigan’s survey instrument. By reading the reports, one can also determine if the survey asked the right questions. Using information from other states can help develop a statistically valid survey instrument in a timely manner.

Objective 2: Form an advisory council.

The purpose of the advisory council will be to provide input into the survey as it is developed so that it reflects Michigan conditions and in the end, provides useful decision-making information to farmers. The core of this group will be farmers who compost. This group could also form the nucleus of a compost cooperative, should they elect to do so.

Objective 3: Conduct a statewide compost market assessment to gather information on the following seven specific items:

1. Identify existing and potential compost users in Michigan.
2. Quantify the current use of compost and other soil amendments.
3. Identify the product specifications for each user group.

4. Estimate the potential future demand for compost.
5. Identify the potential barriers to compost market development.
6. Identify and quantify potential sources of carbon.
7. Estimate costs of production for different market segments based on perceived product specifications, compost demand and other variables.

Objective 4: Prepare a written report summarizing the results of the survey.

3.5. Expected Outcomes

- Interest in composting will increase:
As a result of the information gleaned from this assessment, interest in composting will increase among livestock producers. Most producers are very production orientated, so making compost will not be difficult for them. Michigan State University Extension and others are providing producers with educational resources on how to compost. Most producers have neither the time nor the inclination to do the proper marketing research necessary to move compost into the marketplace. Therefore, because producers are more adept at making compost and less likely to properly market their compost, this will provide new opportunities for compost consultants to work one-on-one with producers to develop marketing plans for compost generated on the farm. Thus, more compost marketing plans will be developed for producers.
- Fewer manure-related complaints:
It is expected there would be fewer manure-related complaints into the Michigan Department of Agriculture (MDA). The majority of complaints are lodged against dairy farms (Table 1). By resource concern, the majority of complaints are related to surface water, followed closely by air quality complaints (Table 2). It is expected that composting manure will help farms both reduce odors and decrease the amount of nutrients and pathogens entering the waters of the state, thus decreasing the number of citizen complaints into MDA.

TABLE 1. Right-to-Farm complaints by enterprise type for FY 2001 through 2004.

Comparison of Complaints Between Enterprise Types (Percent)				
	2004	2003	2002	2001
Beef	22	15	14	11
By-products¹	5	2	3	3
Crops²	9	6	4	6
Dairy	31	32	31	43
Equine	12	18	16	9
Poultry	6	6	8	8
Swine	12	13	14	13
Combination³	3	8	10	7

¹ By-products from fruit and vegetable food processing.

² Crops refer to complaints concerning fertilizer, soil erosion and crop production practices.

³ Two or more species included in complaint.

Source: Michigan Department of Agriculture, Environmental Stewardship Division, Right to Farm Program Fiscal Year Report 2004.

TABLE 2. Environmental complaint concerns for FY 2001 through 2004.

Comparison of Complaints Types (Percent)				
	2004	2003	2002	2001
Air Quality	39	34	33	34
Groundwater	9	6	8	3
Surface water	42	40	41	36
Combination¹	10	20	18	27

¹ Two or more resource concerns cited in complaint.

Source: Michigan Department of Agriculture, Environmental Stewardship Division, Right to Farm Program Fiscal Year Report 2004.

- The development of manure management plans:
A major educational programming thrust for Michigan State University Extension educators is helping producers develop farm-specific manure management plans. These plans focus on the management of manure nutrients and the management of manure and odor. They help producers meet Michigan Right-To-Farm guidelines. Some of the kinds of information required to complete a plan includes estimating the volume of manure and manure nutrients produced, crops grown and realistic yield goals, soil types, and manure and soil nutrient analysis. With this information it becomes easy to identify farms that are not nutrient balanced, which will allow Extension agents to facilitate meetings between the producer and the compost consultant if the producer chooses to compost. Thus it is expected that more farms will become nutrient balanced.
- Opportunity for profit increased:
It is expected that the likelihood of making a profit will increase when markets are identified before compost production begins. The size of the compost operation can be tailored to meet the market demand, thus ensuring there is enough cash flow to continue in the long term. Doing the proper marketing research beforehand also reduces the hidden surprises that can rob a startup operation of capital resources. Thus, composting manure becomes economically viable for the farm.
- Support for a regional composting facility:
The compost market assessment report will provide farmers with data on the existing and potential demand for compost in Michigan markets. With this information, interested farmers could determine if compost markets are strong enough to support a regional compost processing facility. Assuming multiple strong markets, farmers could then form a compost cooperative and complete a feasibility study on several compost facility sites in West Michigan. The end result would be building a composting facility. It is estimated that 40,000 tons of compost from manure could be produced annually with an estimated value of \$1.8 million.

4. MARKET ASSESSMENT METHODS

4.1 Overview

The study consisted of a survey conducted by mail among three key audiences in Michigan: farmers, nurseries and landscape firms. The numerical composition of each audience sample is presented in this section for each audience group. Data collection occurred in the spring of 2004. Survey System (Version 8.0) from Creative Research was used to interpret the raw data.

The work was conducted under the guidance of Charles Gould, MSU Extension-Ottawa County. Strategic and management services were provided by Sustainable Research Group (Grand Rapids, MI), William A. Stough, CEO. Technical support for the survey was provided by Millennium Research Group, Ltd. (Grand Rapids, MI), Frederick D. Howell, Principal.

Using the U. S. Government's Standard Industrial Classification/North American Industry Classification System (SIC/NAICS), business types in the nursery and landscape sectors and farm types in agriculture were specified. Mailing lists for each audience group were acquired from Dun & Bradstreet's Million Dollar Directory service. This directory lists firms which have a minimum of one million dollars in sales. *Therefore, this study was confined to large farms and large firms in the nursery and landscape sectors that could be the largest potential consumers of compost.*

4.2 Sample Population

The surveys were mailed out to a total of 3,818 randomly obtained sample locations in three major categories; landscape firms, nurseries and agricultural operations. A total of 1,024 responses were received resulting in a 27 percent total rate of return. Details on each of the three sample populations are provided below.

Landscape Firms - The sampling frame for this segment of the study, using SIC/NAICS codes, listed a count of 9,034 landscape firms in Michigan. Questionnaires were mailed to 1,333 firms. Usable completed questionnaires were returned by 276 respondents, a 21 percent response rate.

The most numerous landscape firm types represented by the returned questionnaires were landscape maintenance contractors, which comprised 31 percent of respondents, excavating firms -24 percent - and landscape installation contractors - 22 percent.

Nurseries - The sampling frame for this segment of the study drew upon a pool, using SIC/NAICS codes, of 830 firms. This list was supplemented by an additional 261 firms known to be qualified for inclusion, thus the number of firms used as the basis for projections totals 1,091. Questionnaires were mailed to all firms on this list. A total of 311 usable questionnaires were returned, a response rate of 28 percent.

Agriculture - The sampling frame for this segment of the study, using SIC/NAICS codes, listed 9,215 farms. The list was modified to include certain specialty farms on a replacement basis. The universe count was thus maintained at 9,215 with the composition of farms, distribution of outgoing questionnaires and returns listed in Table 3. The survey database was weighted to adjust for population proportions. The data presentation in this report section uses the weighted data except where otherwise noted. While not specifically stated in the chart below, livestock facilities were included in the population receiving the survey. They are in the "Farms (from Dunn & Bradstreet list)" category.

TABLE 3. Agriculture survey sample populations.

Category	Universe	Number of Questionnaires Mailed	Questionnaires Returned	
			Number	Percent
Farms (from Dunn & Bradstreet list)	8,101	816	229	28%
Tree/Small Fruit	450	200	74	37%
Blueberry/Grape	421	169	64	38%
Vegetable	134	100	32	32%
Organic	109	109	38	35%
Total	9,215	1,394	437	31%

4.3 Questionnaire Construction

Questionnaires were constructed to ensure that significant operational differences were accounted for between the three major classifications of sample populations: landscape industries, nurseries, and agriculture. Landscape and nurseries focused more on the retail nature of their compost needs, such as when they use it as bedding and how. The agricultural population was asked to respond to their bulk use of compost the type of crops and acreage farmed. The sections that sought input on personal opinions related to compost and the use of compost were customized to account for the differences between the three classifications of businesses. Survey questionnaires can be found in Appendix II.

4.4 Survey Pre-testing

After the agriculture, nursery and landscape surveys were developed they were sent to businesses within each classification for evaluation and critiquing. Three nurseries, two farms and no landscape surveys were returned. Based on their comments, the survey instruments were modified to improve clarity.

4.5 Study Limitations

The study represents a snapshot of the current use, beliefs and expectations by respondents of the three sample populations regarding compost in their segment. It is limited by the responses to the questions asked in the questionnaires, which were designed to fulfill the research objectives stated. The results of the study are not intended to represent a business or marketing plan for any specific compost manufacturing operation, rather it documents on a macro-scale the potential demand for compost, its generally desired quality, nutrient specifications and potential cost purchasers may be willing to pay in the State of Michigan.

It should be noted that Objective 3 Number 6 in Section 3.4 (identify and quantify potential sources of carbon) will be released as a separate report. Finally, to fully answer Objective 3 Number 7 in Section 3.4 (estimate costs of production for different market segments based on perceived product specifications, compost demand and other variables) requires a different set of questions than were used to gather data for this report, and therefore is not presented in this report.

5. MARKET ASSESSMENT RESULTS

Calculations of various supply and demand factors are reported in the following sections for each of the three sectors studied: landscape firms, nurseries and farms. They are recapped here in order to present a combined picture of supply and demand.

5.1. Supply Factors

- **Green Waste.** Fifty-one (51) percent of landscape firms generate an average of 710 cubic yards of green waste annually. Estimated total green waste generated: 3.3 million cubic yards. Cost of green waste disposal for landscape firms averages \$6080, for an estimated total disposal cost in the landscape sector of about 28 million dollars.

For the 58 percent of nurseries that generate green waste total cost of green waste disposal is estimated at a little fewer than 2 million dollars. Combining the two sectors total cost of green waste disposal comes to an estimated 30 million dollars.

- **Compost Production.** About one in four landscapers (28 percent) currently produce compost on their own. Average annual production within this group amounts to 379 cubic yards, or 960,000 cubic yards for the group as a whole. Among nurseries a median of 50 percent of green waste is composted. Since the average green waste generation by nurseries is 11.2

cubic yards per week, total annual compost production by nurseries is estimated at 151,000 cubic yards. Combining the two sectors total compost production currently amounts to 1.1 million cubic yards. It should be noted that the agricultural survey sent to farmers did not ask about compost production, only about compost consumption, which was an oversight when the survey was developed.

5.2. Demand Factors

Thirty-six percent of landscapers presently use compost. At an average consumption rate of 253 cubic yards, total annual usage for the group is an estimated 823,000 cubic yards. Some 65 percent indicated interest in using compost, which projects to a total demand potential of 21 million dollars in the landscape sector. Among nurseries, 47 percent indicate interest in using purchased compost. This works out to a demand potential of one million dollars. Forty-four (44) percent of farmers indicate interest in using compost. Total demand potential within the farming community as defined in this study is estimated at 178 million dollars. More details that support these assumptions are found in Sections 5.3, 5.4 and 5.5. Combining all three sector's total demand potential equals 200 million dollars, of which...

- 89 percent is in agriculture-- \$178 million
- 10 percent is in landscaping-- \$21 million
- 1 percent is in nurseries-- \$1 million

Total \$200 million

Each of the next three sections presents findings in detail for the individual sectors.

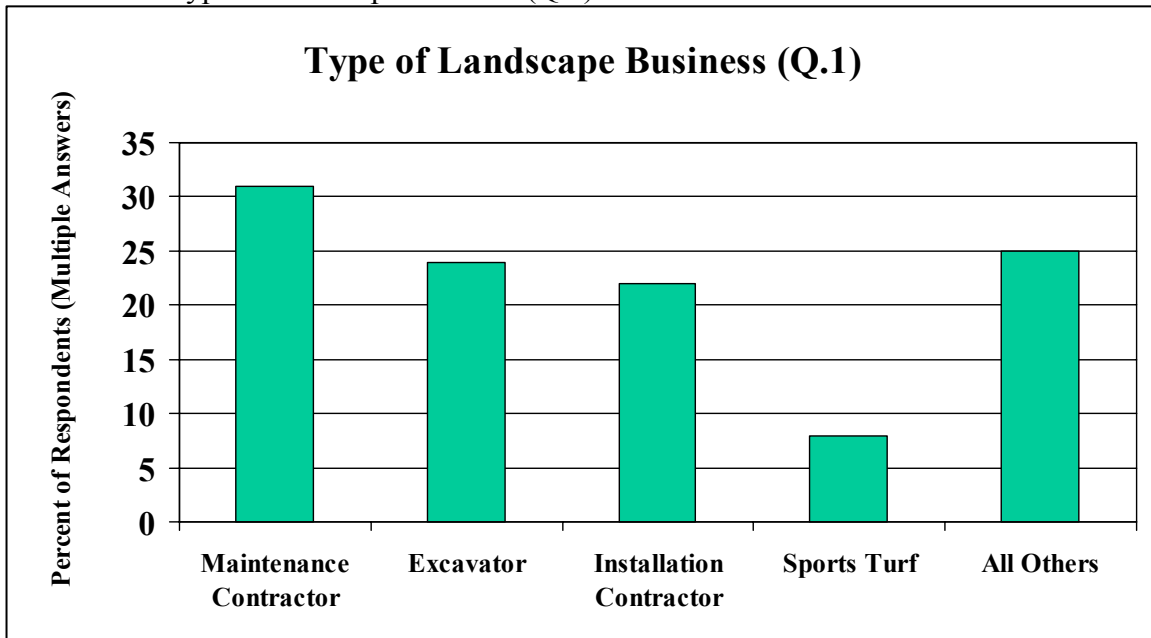
5.3. Landscape Industry

5.3.1 Respondent Characteristics

The sampling frame for this segment of the study, using SIC/NAICS codes, listed a count of 9,034 landscape firms in Michigan. Questionnaires were mailed to 1,333 firms. Usable completed questionnaires were returned by 276 respondents, a 21 percent response rate.

The most numerous landscape firm types represented by the returned questionnaires were landscape maintenance contractors, which comprised 31 percent of respondents, excavating firms—24 percent—and landscape installation contractors—22 percent.

FIGURE 1. Type of landscape business (Q.1).

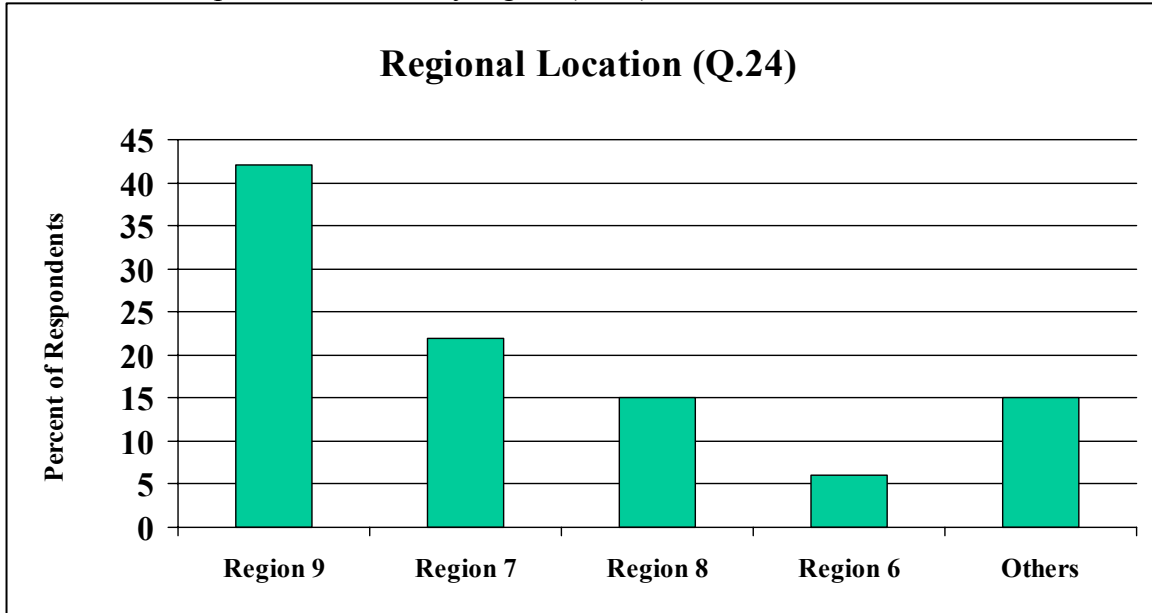


Other classification information obtained includes the following:

- Average age: 47 years, with 54% over age 45
- 83% are males.
- 80% are company owners
- 83% make the compost purchasing decisions

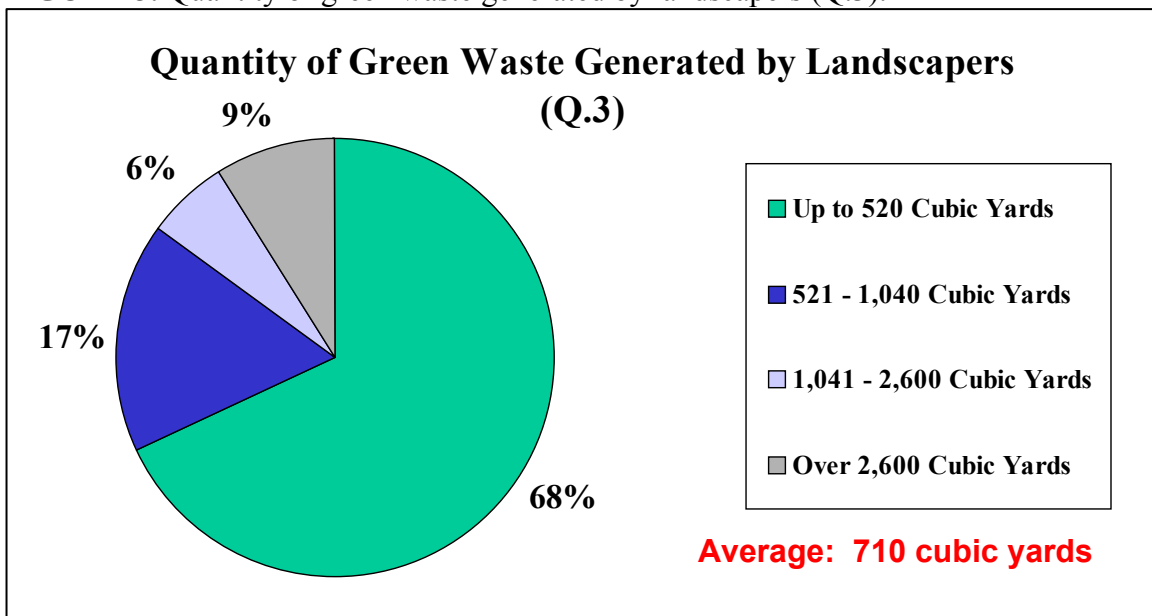
Each respondent reported the county in which the business was located. Counties were grouped into the same regions as those found in Michigan Agricultural Statistics. A list of regional assignments for counties can be found in Appendix I of this report.

Region 9 (Southeast) and Region 7 (Southwest) accounted for nearly two-thirds of respondent locations.

FIGURE 2. Respondent location by region (Q.24).

5.3.2 Green Waste

Half (51 percent) of landscape operations generate green waste. Those who generate green waste produce an average 710 cubic yards annually.

FIGURE 3. Quantity of green waste generated by landscapers (Q.3).

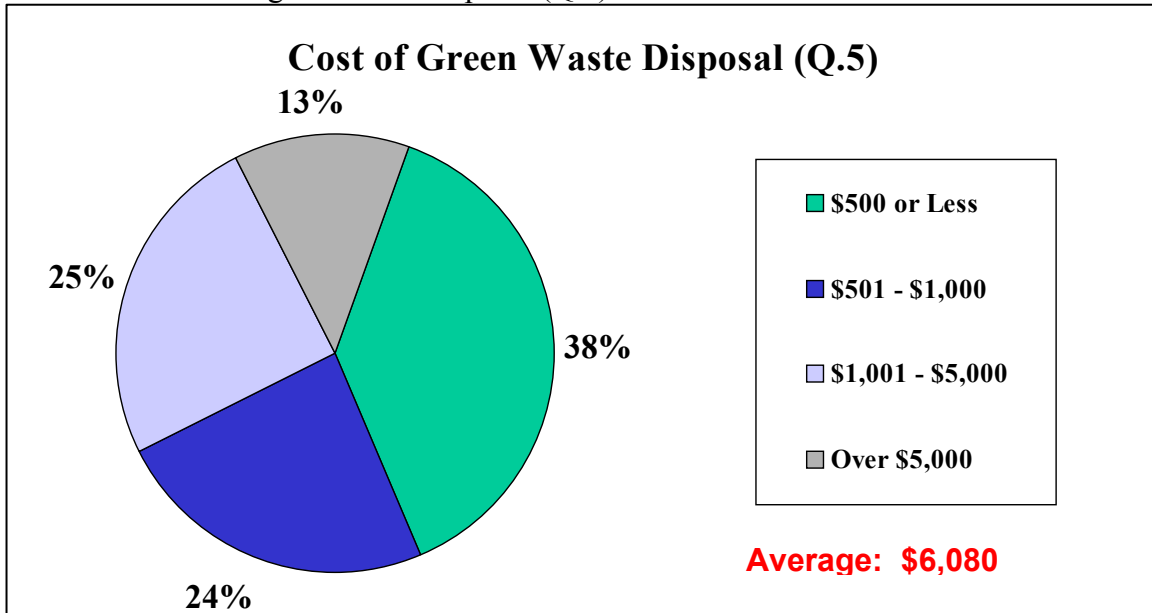
The total green waste generated by landscape firms projects out to nearly 3.3 million cubic yards annually. By business type, those who generate green waste are typically landscape contractors (both installation and maintenance providers). Excavating companies typically do not generate green waste. Respondents who reported that their firms generate green waste are slightly younger, on the average, than those who do not. Geographically, firms in Region 8 (South Central) are less likely to be green waste generators.

Green waste from landscapers is presently disposed of in five different ways:

- Burned.
- Buried.
- Composted.
- Hauled off in dumpster.
- Land applied.

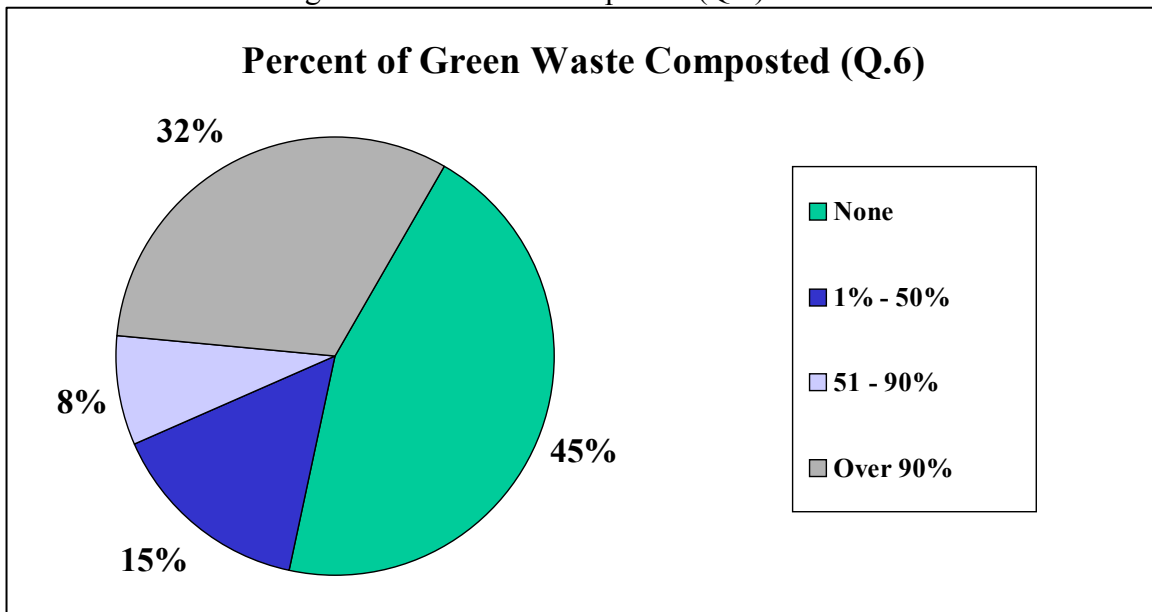
Cost of disposal ranges up to nearly \$200,000 annually, with the average being about \$6,100. This projects to a total of \$28.0 million for the landscape sector.

FIGURE 4. Cost of green waste disposal (Q.5).



Just over half of landscapers who generate green waste compost the waste. Most of those who do compost process most of their green waste in that manner.

FIGURE 5. Percent of green waste that is composted (Q.6).



Written reasons given for not composting green waste fall into these broad categories (listed randomly):

- Burn green waste.
- Picked up or taken to nearby recycling centers.
- Not enough time, space and budget.
- Spread on fields or left on lawns/turf.
- Lack of equipment and experience.
- Annual volume is very small.

5.3.3 Compost Production

Landscape firms are both producers and consumers of compost. Compost production in annual terms varies to as high as nearly 5,000 cubic yards per firm. Nearly three in ten producers generate 25 cubic yards or less, with a similar proportion generating between 25 and 100 cubic yards. Another one-quarter produce between 100 and 500 cubic yards while 15 percent generate over 500 cubic yards.

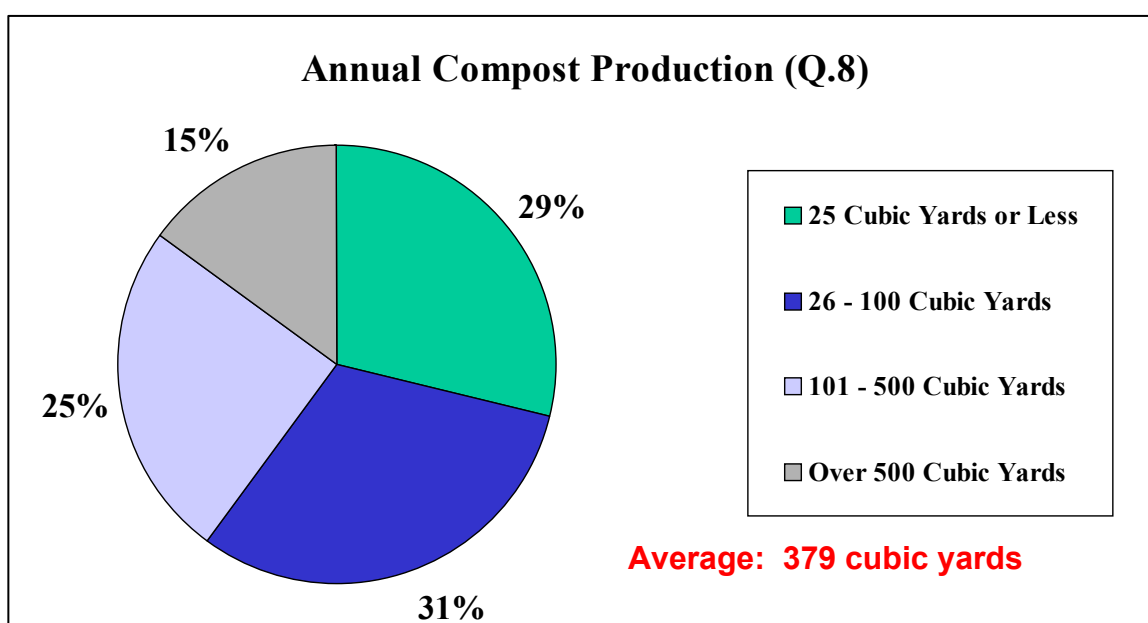


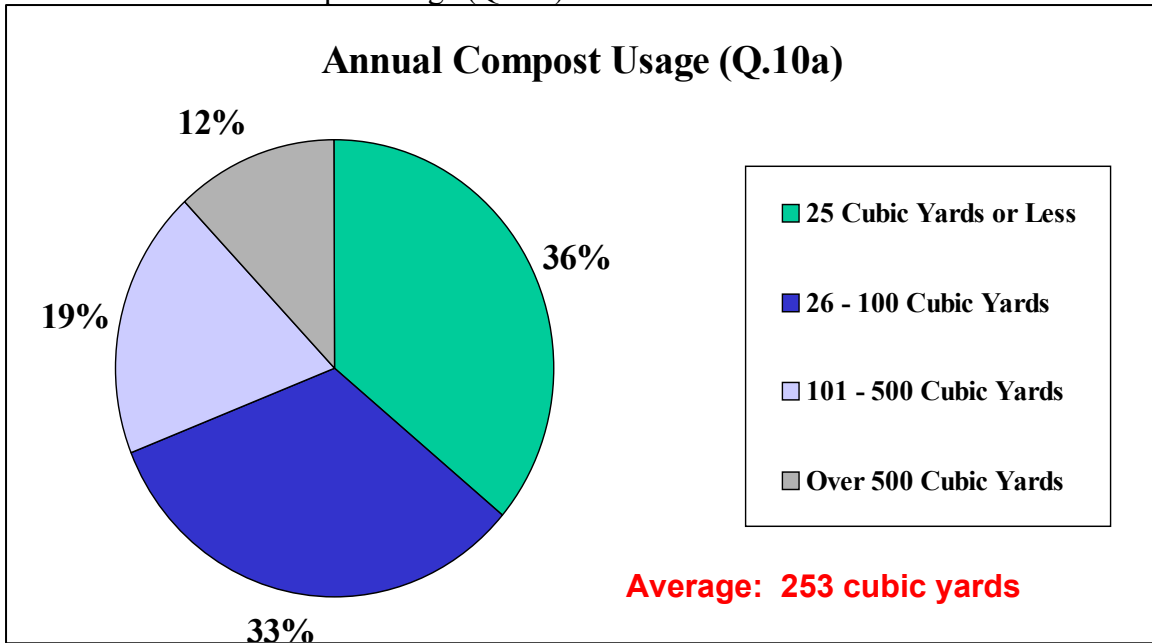
FIGURE 6. Annual compost production (Q.8).

Those landscape operators who compost generate an average of 379 cubic yards of compost annually. This average projects to an annual total of 960,000 cubic yards annually for the landscape sector.

5.3.4 Compost Usage

Over one-third of firms (36%) use compost during the growing season. Usage quantities are variable. Nearly four in ten firms use 25 cubic yards or less while about one-third (31%) use over 100 cubic yards.

FIGURE 7. Annual compost usage (Q.10a).

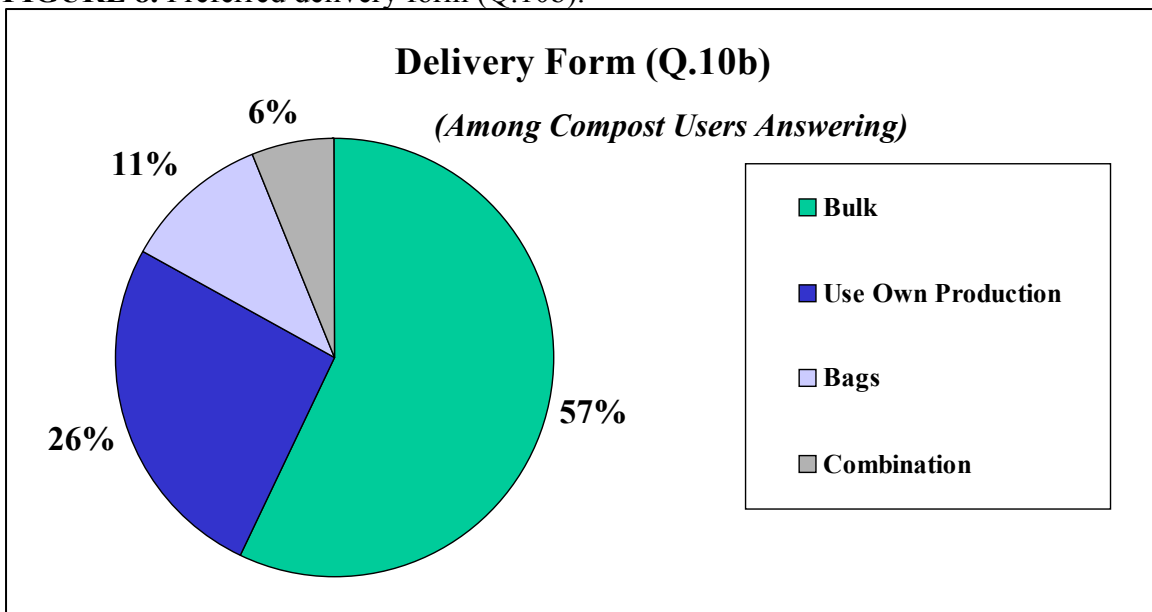


Projected total annual consumption of compost by the landscape sector is 823,000 cubic yards.

By business type within the landscape category, those who use compost are typically landscape contractors, both installation and maintenance providers. Excavating companies typically do not use compost. Geographically, those in Region 7 (Southwest) are less likely to be compost users.

The preferred form of compost delivery is bulk (57 percent). Only about one in ten prefer bags for delivery.

FIGURE 8. Preferred delivery form (Q.10b).



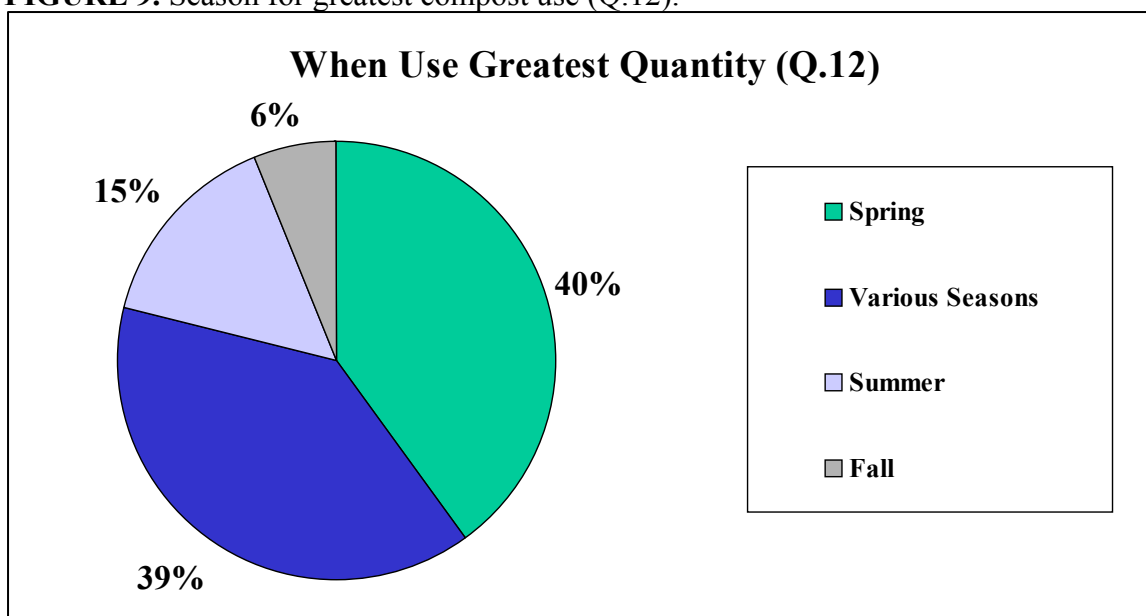
Respondents were asked to indicate their uses of compost. Their answers are presented in Table 4. Seventy-eight percent of the respondents use compost as a soil amendment when new planter beds are put in, while only 22 percent use compost to improve poor soils.

TABLE 4. Uses of compost.

	As a Soil Amendment	As a Mulch	Soil Health
New Installations:	Planter beds—78% Trees/shrubs—73% Turf/lawns—42%	Planter beds—73% Beds around trees—62% General yard mulch—35% Control erosion—21% Walkways—20%	
Maintenance of:	Planter beds—79% Trees/shrubs—58% Turf/lawns—39%	Planter beds—76% Beds around trees—64% General yard mulch—37% Control erosion—24% Walkways—24%	
Improvement of:			Topsoil component—78% Improve poor soils—22%

Spring is the season when compost is used in greatest quantities, as reported by four in ten respondents. A nearly equal proportion, however, reported the heaviest usage varies.

FIGURE 9. Season for greatest compost use (Q.12).



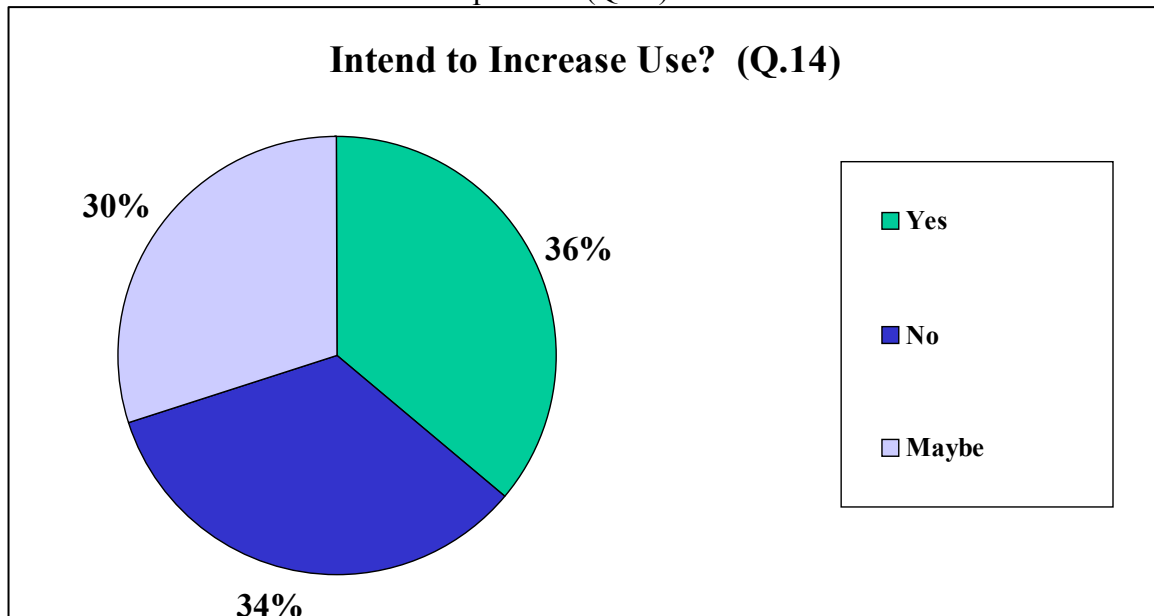
Nearly half (46%) of compost-using respondents say they purchase compost from wholesale sources. Only 14 percent said they purchase from retail sources. It should be noted that 40% of the responses in the “Other” category were businesses who made their own compost.

FIGURE 10. Where compost is most likely purchased (Q.13).

5.3.5 Product Adoption Issues

Nearly equal proportions of respondents indicated they intended to increase or not increase their usage of compost. Three in ten respondents were undecided on the issue. Written reasons cited by those who were undecided fell into these three broad categories (listed randomly):

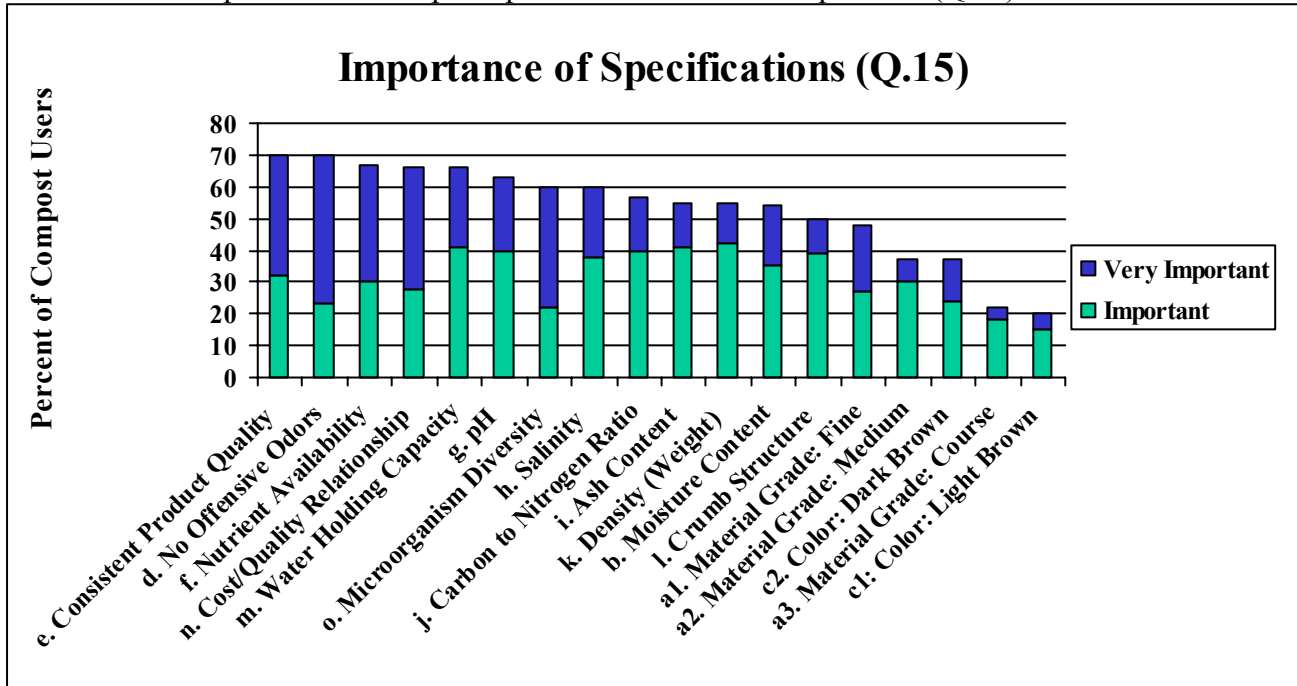
- Depends on the economy/business profitability.
- Depends on how much using compost increases work load.
- Depends on if an application or use can be identified

FIGURE 11. Intent to increase compost use (Q.14).

Landscape contractors who specialize in installations are more likely than not to intend to increase their composting activity. Also, they are younger, on the average.

According to survey respondents, the five most important compost specifications are consistent product quality, no offensive odors, nutrient availability, the cost/quality relationship and water holding capacity. This is consistent with the primary uses of compost identified earlier in the report. The least important specifications were related to compost color and grade. The graph below presents the specification elements in descending order of total importance with each bar segmented to show the percent saying “Important” and the percent saying “Very Important”.

FIGURE 12. Importance of compost specifications for landscape firms (Q.15).



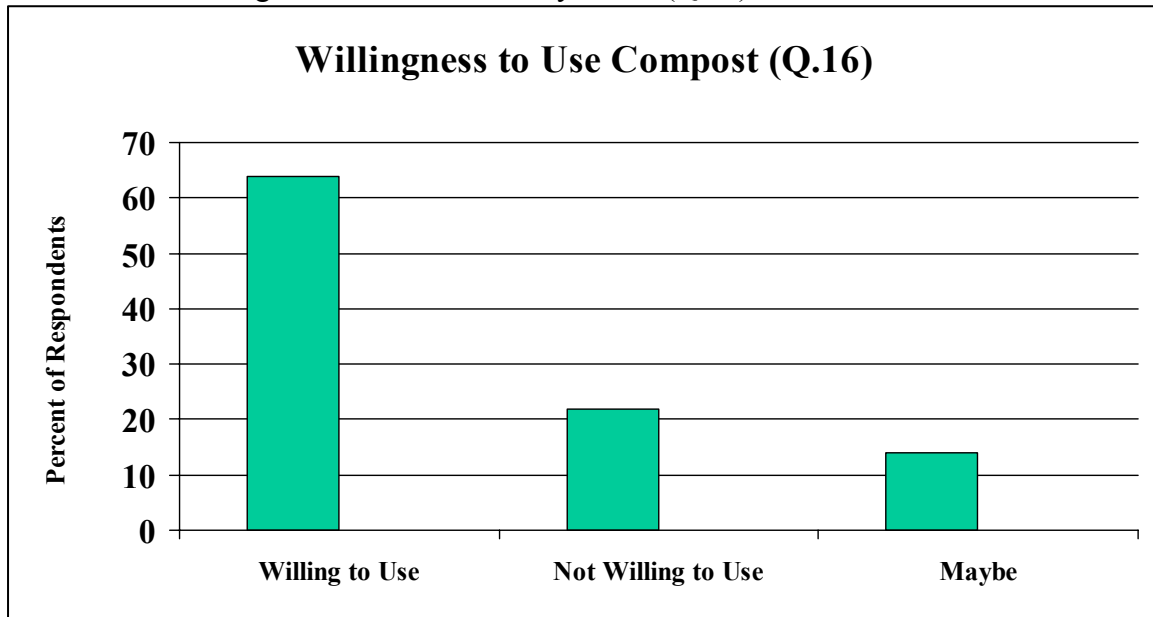
Written responses on compost specifications fell into the following four broad topics (listed randomly):

- Must be weed free.
- Must have no pesticides or toxic chemicals.
- Must be able to grow plants.
- Must be a good resale product.

Those who are willing to use compost that met their specifications are more likely to be landscape installation specialists. Their position in the company is more likely to be that of owner and they are more likely to be located in Region 9 (Southeast).

They are less likely to be firms that specialize in either sports turf or excavation services. Also, they are less likely to be located in Region 7 (Southwest).

FIGURE 13. Willingness to use compost that met respondent expectations in place of or in addition to other organic materials currently in use (Q.16).

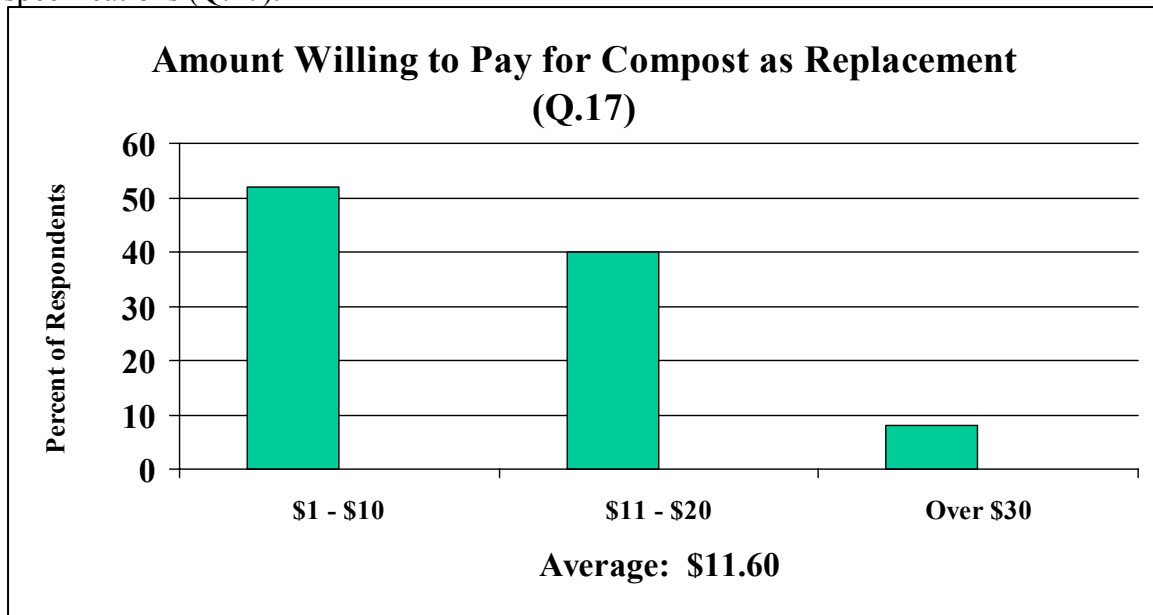


Nearly two-thirds of respondents (64 percent) indicated interest in using compost that met their specifications as a replacement for other organic materials they currently use. This group uses an average 307 cubic yards of compost annually. On the average the price they would be willing to pay is \$11.60 per cubic yard. Projecting to a total for the landscape sector using these figures market demand is estimated at 21 million dollars.

Landscapers who were undecided gave the following written responses as their reasons (listed randomly and categorized):

- Availability of compost suitable for my use.
- Cost of purchasing compost
- Want to see scientific data before using.
- Depends on application and need.
- See no need to compost.

FIGURE 14. Amount respondents are willing to pay for compost that meet their specifications (Q.17).



Regardless of whether they currently use compost or not, all respondents were asked to indicate their level of agreement with a series of statements about composting. Their reactions are set forth in the following three categories:

Describe your business situation

When asked if they have organic wastes that really need to be recycled, 40% of the respondents indicated that they did. Thirty-seven percent of the respondents are interested in composting their own waste materials on their own operation. Finally, 31% of the respondents have customers that are seeking a viable organic alternative to chemical-only treatments.

Describe your attitude toward compost

When asked if they valued the use of compost more highly than chemical soil additives, 48% of the respondents agreed with the statement. However, when asked if they supplement compost use with commercial fertilizers and/or soil amendments, 37% indicated they did. It should be noted that 40% of the respondents answered “not applicable” to the same statement.

Thirty-six percent of the respondents agreed that the use of compost has been more economical in the long run than other commercial fertilizers/soil amendments. When asked if compost is the primary soil amendment/source of nutrients used by the respondent, 25% agreed with the statement while 30% disagreed.

When asked if the quality of compost varies greatly enough that the respondent is reluctant to use it, 25% agreed with the statement while 39% disagreed. However, 42% of the respondent did say that they would be more inclined to use compost if quality standards did exist.

Thirty-four percent of the respondents agreed that the quality of compost they produce for their own use is satisfactory. However, 41% of the respondents felt they did not know much about the science of composting.

Describe your beliefs about the economics of making and using compost

Forty-five percent of the respondents indicated they did not know much about the economics of composting. Forty-nine percent of the respondents agreed with the statement “producing compost for commercial sale is not currently economical for me”. When asked if producing compost for commercial sale is worth the time and money spent doing it, only 19% percent of the respondents agreed while 29% disagreed. However, 38% of the respondents indicated they would consider producing compost for sale if the economic benefits could be clearly demonstrated to them.

When asked “producing compost for my own use is not currently economical for me”, 39% of the respondents agreed with the statement while 25% disagreed. Thirty-one percent of the respondents felt that “producing compost for their own use is worth the time and money spent doing it” while 27% agreed. However, 50% of the respondents indicated they would consider using compost if the economic value of doing so could be clearly demonstrated to them.

5.3.6 Significant Landscape Market Assessment Results

- 36 percent of respondents are from Regions 7 and 9 (Southwest and Southeast or the West Michigan and Detroit areas).
- 38 percent currently pay \$1,000 to \$5,000 a year to dispose of green waste.
- 45 percent of green waste generated is not composted.
- 60 percent of respondents in this sector produce less than 100 cubic yards of their own compost per year.
- 31 percent of respondents in this sector use more than 500 cubic yards of compost per year.
- 83 percent of respondents in this sector prefer a bulk form of delivery.
- 64 percent would consider increasing their use of compost.
- Consistent product quality, no offensive odors and nutrient availability were the three most important specifications and grade and color the least important.
- 74 percent may be willing to use compost in their operations.
- 48 percent are willing to pay \$11 to \$30 per cubic yard to purchase compost.
- Respondents in this sector have a very positive opinion of the utility of compost.

5.4. Nursery Industry

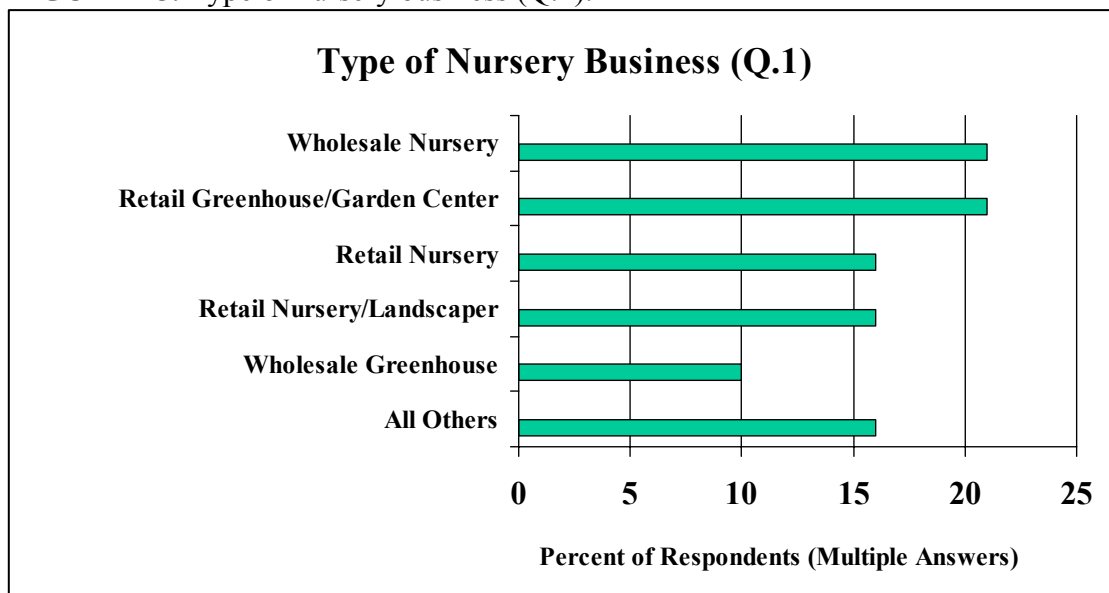
5.4.1 Respondent Characteristics

The sampling frame for this segment of the study drew upon a pool, using SIC/NAICS codes, of 830 firms. This list was supplemented by an additional 261 firms known to be qualified for inclusion. Thus the number of firms used as the basis for projections totals 1,091.

Questionnaires were mailed to all firms on the combined list. A total of 311 usable questionnaires were returned, a response rate of 28 percent.

The most numerous nursery firm types represented by the returned questionnaires were wholesale nursery and retail greenhouse/garden center, each comprising 21 percent of respondents. Next most numerous were retail nursery and retail nursery/landscaper, each comprising 16 percent of respondents.

FIGURE 15. Type of nursery business (Q.1).

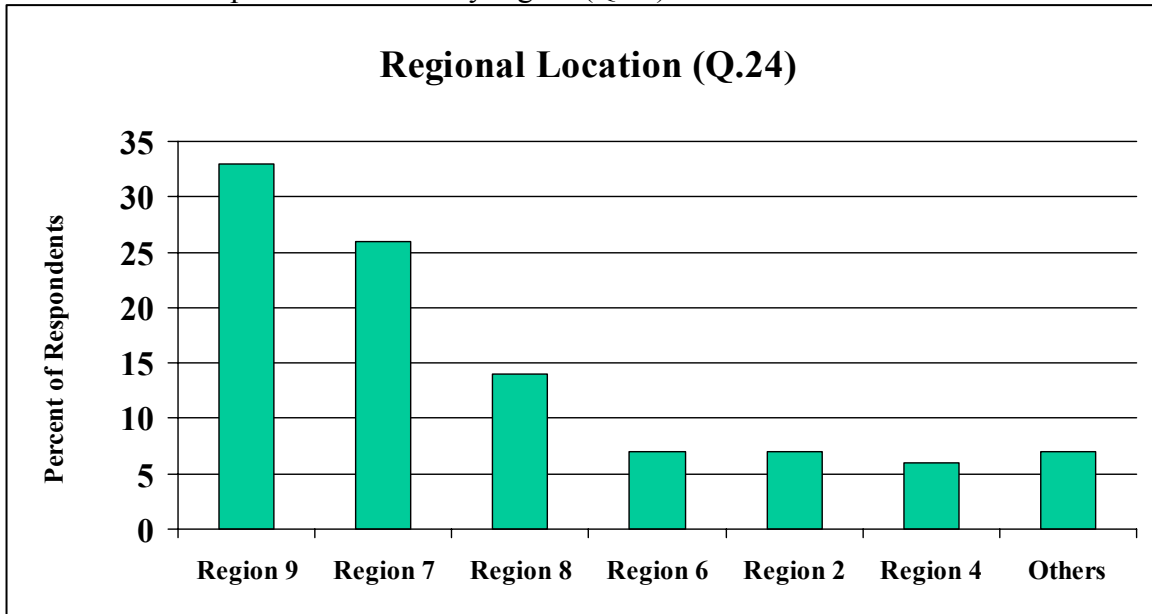


Other classification information obtained includes the following:

- Average age: 51 years, with 61% over 45.
- 75% are males.
- 80% are company owners, 22% are growers and 27% are managers.
- 76% make the growing media purchasing decisions
- Average greenhouse size: 102,000 square feet.
- Average nursery acreage: 179 acres

About one-third of respondent firms are in Region 9 (Southeast), with an additional 26 percent in Region 7 (Southwest).

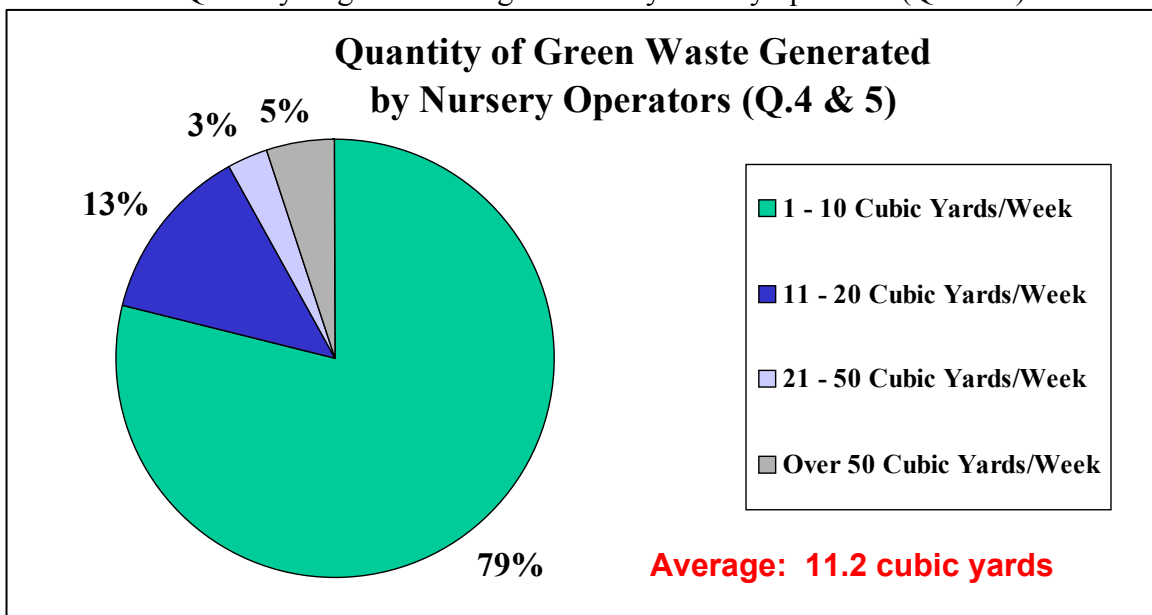
FIGURE 16. Respondent location by region (Q.24).



5.4.2 Green Waste

Fifty-eight percent (58%) of nursery operators generate green waste. They produce an average of 11.2 cubic yards per week during the growing season.

FIGURE 17. Quantity of green waste generated by nursery operators (Q.4 & 5).

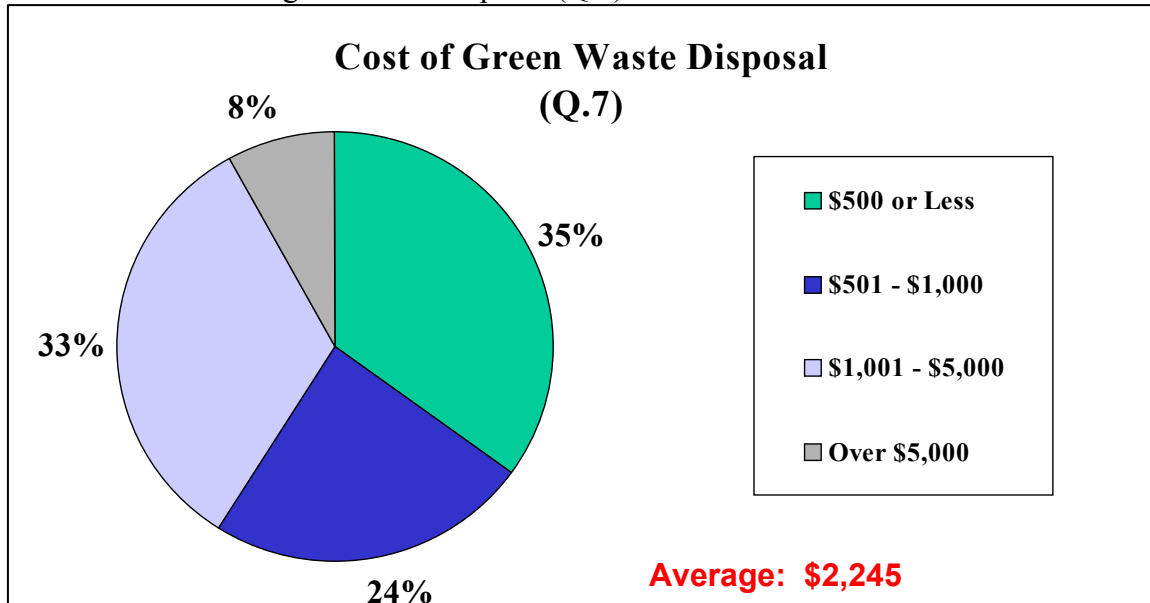


The only nursery business type that is atypical on this issue is retail nursery/landscaper, which is three times as likely to be generators of green waste. Generators of green waste are more likely to be familiar with composting and more likely to be the person who makes growing media purchase decisions for the

firm. No other demographic or geographic measures distinguish those who generate green waste from those who do not.

Cost of disposal ranges up to nearly \$50,000 annually.

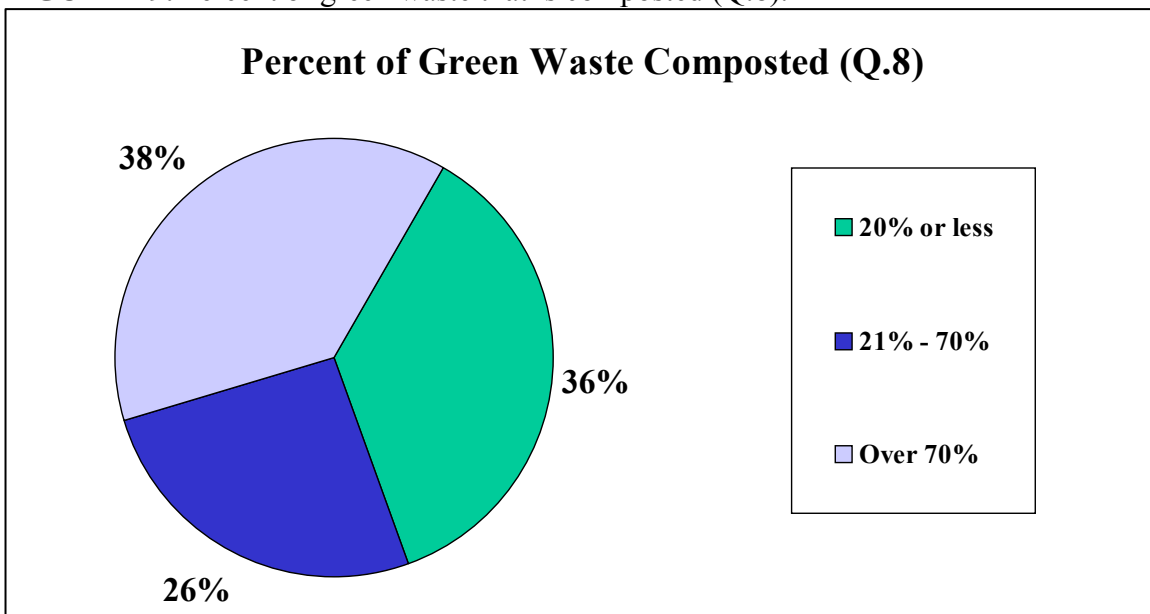
FIGURE 18. Cost of green waste disposal (Q.7).



This projects to an annual cost to the nursery sector of \$1.4 million for disposal of green waste. Only two percent say they dispose of green waste by piling it somewhere on the nursery premises.

A little over one-third of those who generate green waste say they compost up to 20 percent. About one-quarter compost between 21 percent and 70 percent. And nearly four in ten compost over 70 percent of their green waste.

FIGURE 19. Percent of green waste that is composted (Q.8).



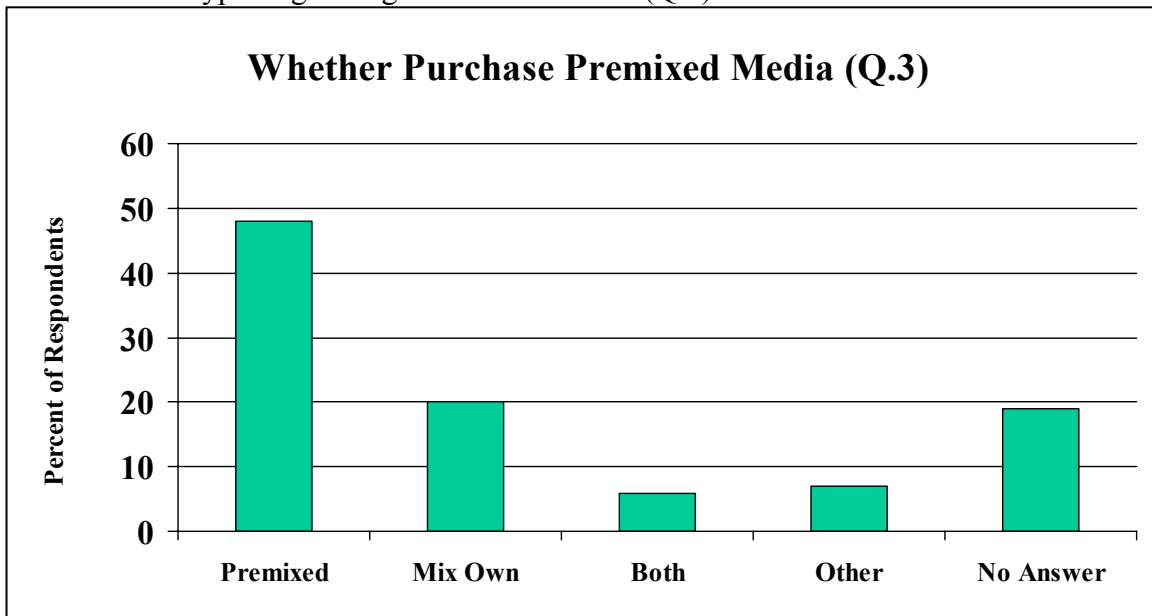
Written reasons given for not composting green waste fell into these broad categories (not ranked):

- An additional cost.
- Time constraints/not convenient.
- Not enough space to compost.
- Don't have proper equipment.
- Concern over spreading plant diseases/hygiene issues.
- Green waste is burned or put in a dumpster.
- Green waste is land applied and disked in.

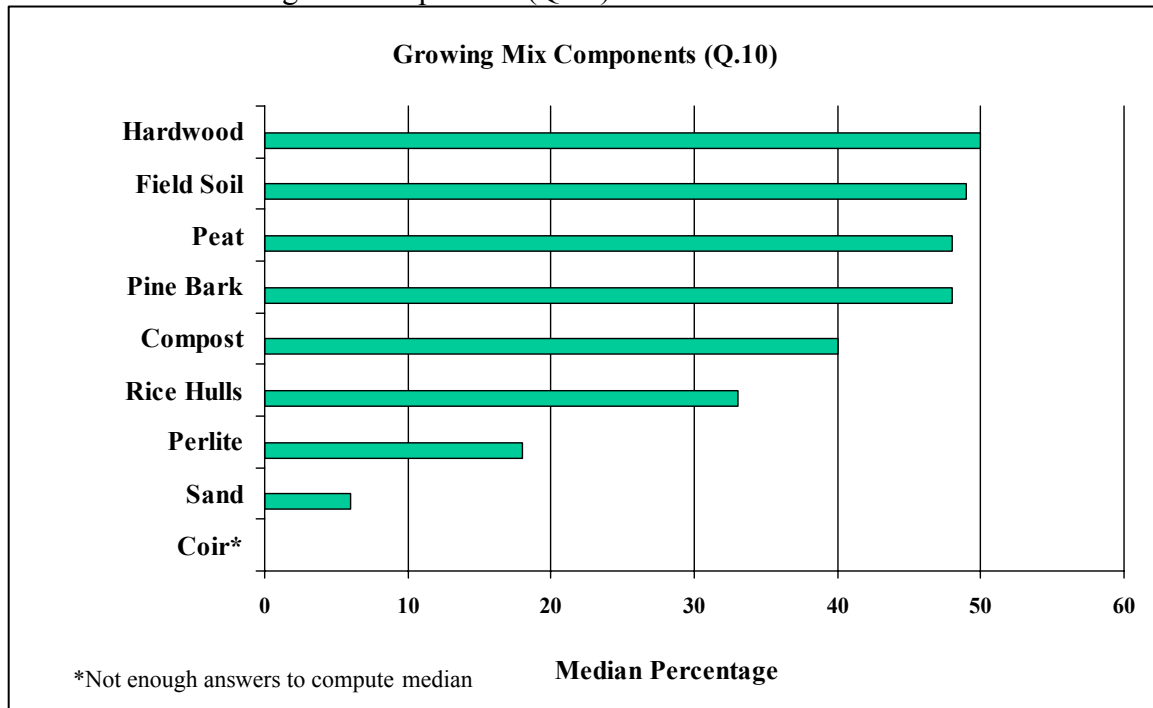
5.4.3 Compost Usage

Seventy-two percent (72%) say they are familiar with compost as a component of a growing substrate. Nearly half—48 percent purchase premixed media. Some one-fifth mix their own.

FIGURE 20. Type of growing media that is used (Q.3).



Five elements comprise the most popular components of growing mixes. Each component is 40 to 50 percent, as shown in the graph below.

FIGURE 21. Growing mix components (Q.10).

5.4.4 Product Adoption Issues

Regardless of whether they currently use compost or not, all respondents were asked to react to a series of statements about composting. Their reactions are set forth in the following three categories:

Describe your business situation

When asked if they have organic wastes that really need to be recycled, 35% of the respondents indicated that they did. However, 42% of the respondents are interested in composting their own waste materials on their own operation. Finally, 31% of the respondents have customers that are seeking a viable organic alternative to chemical-only treatments.

Describe your attitude toward compost

When asked if they valued the use of compost more highly than chemical soil additives, 38% of the respondents agreed with the statement. However, when asked if they supplement compost use with commercial fertilizers and/or soil amendments, 41% indicated they did. It should be noted that 45% of the respondents answered “not applicable” to the same statement.

Twenty-six percent of the respondents agreed that the use of compost has been more economical in the long run than other commercial fertilizers/soil amendments. When asked if compost is the primary soil amendment/source of nutrients used by the respondent, 17% agreed with the statement while 36% disagreed. However, 29% of the respondents use compost in potting mixes and 32% said they apply compost to soil or crops.

When asked if the quality of compost varies greatly enough that the respondent is reluctant to use it, 32% agreed with the statement while 32% disagreed. However, 40% of the respondent did say that they would be more inclined to use compost if quality standards did exist.

Thirty-four percent of the respondents produce compost for their own use. Thirty-five percent of the respondents agreed that the quality of compost they produce for their own use is satisfactory. However, 38% of the respondents felt they did not know much about the science of composting.

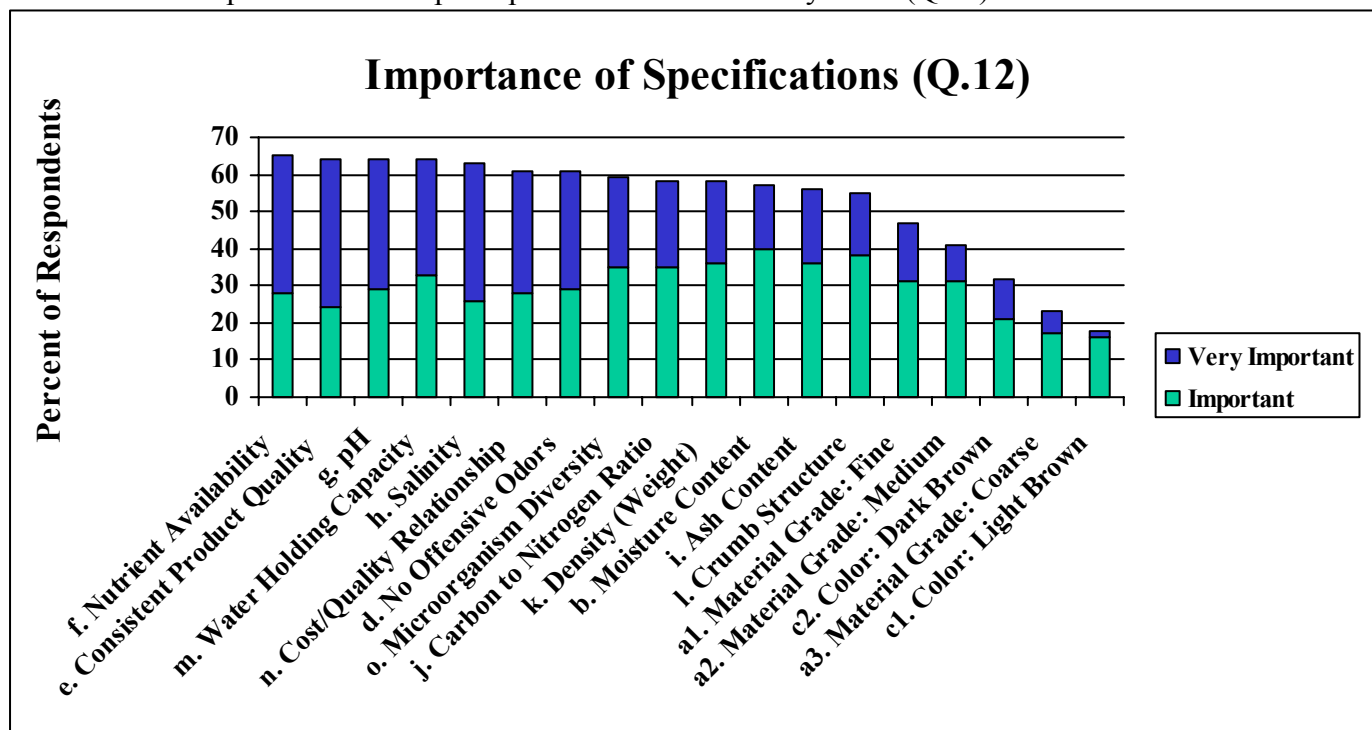
Describe your beliefs about the economics of making and using compost

Forty-five percent of the respondents indicated they did not know much about the economic of composting. Four percent produce compost for sale and 23% sell compost made by others. Fifty-one percent of the respondents agreed with the statement “producing compost for commercial sale is not currently economical for me”. When asked if producing compost for commercial sale is worth the time and money spent doing it, 11% percent of the respondents agreed. It should be noted that 40% of the respondents indicated “not applicable” to that statement. However, 33% of the respondents indicated they would consider producing compost for sale if the economic benefits could be clearly demonstrated to them.

When asked “producing compost for my own use is not currently economical for me”, 35% of the respondents agreed with the statement while 23% disagreed. Thirty-five percent of the respondents felt that “producing compost for their own use is worth the time and money spent doing it” while 26% disagreed. However, 50% of the respondents indicated they would consider using compost if the economic value of doing so could be clearly demonstrated to them.

According to survey respondents, the five most important compost specifications are nutrient availability, consistent product quality, pH, water holding capacity and salinity. This is consistent with the primary uses of compost identified earlier in the report. The least important specifications were related to compost color and grade. The graph below presents the specification elements in descending order of total importance with each bar segmented to show the percent saying “Important” and the percent saying “Very Important”.

FIGURE 22. Importance of compost specifications for nursery firms (Q.12).



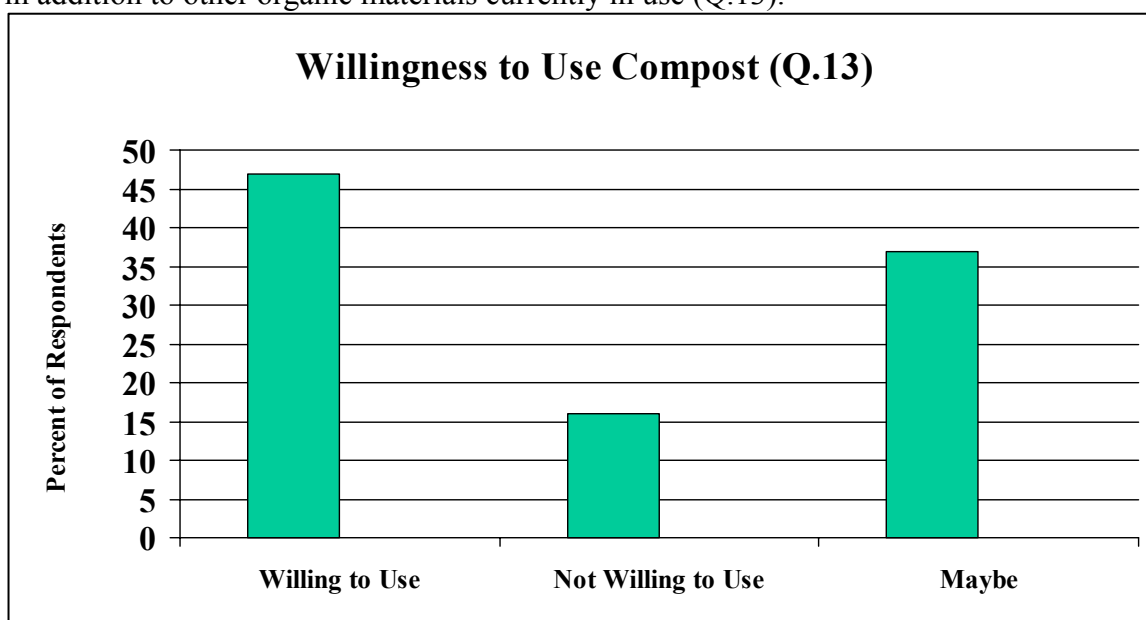
Just under half—47 percent—of nursery operators are interested in using compost in place of other organic materials. On the average the price they would be willing to pay is \$12.17 per cubic yard.

To estimate market potential for compost among nurseries current conversion rates of green waste into compost were used as a proxy for the potential demand. In other words, the assumption was made that nurseries would purchase compost instead of using what they themselves produce from green waste.

The relevant calculations are as follows: 47 percent of nurseries say they are willing to purchase compost. They currently produce an average of 380 cubic yards of green waste during an average growing season and compost 55 percent of that green waste. Thus an average of 209 cubic yards of compost is produced. Assuming that the 47 percent (390 firms) purchase this amount and pay \$12.17 per cubic yard the total demand potential is one million dollars.

Those willing to use compost are more likely to be already familiar with composting. No other demographic or geographic measures distinguish this group.

FIGURE 22. Willingness to use compost that met respondent expectations in place of or in addition to other organic materials currently in use (Q.13).

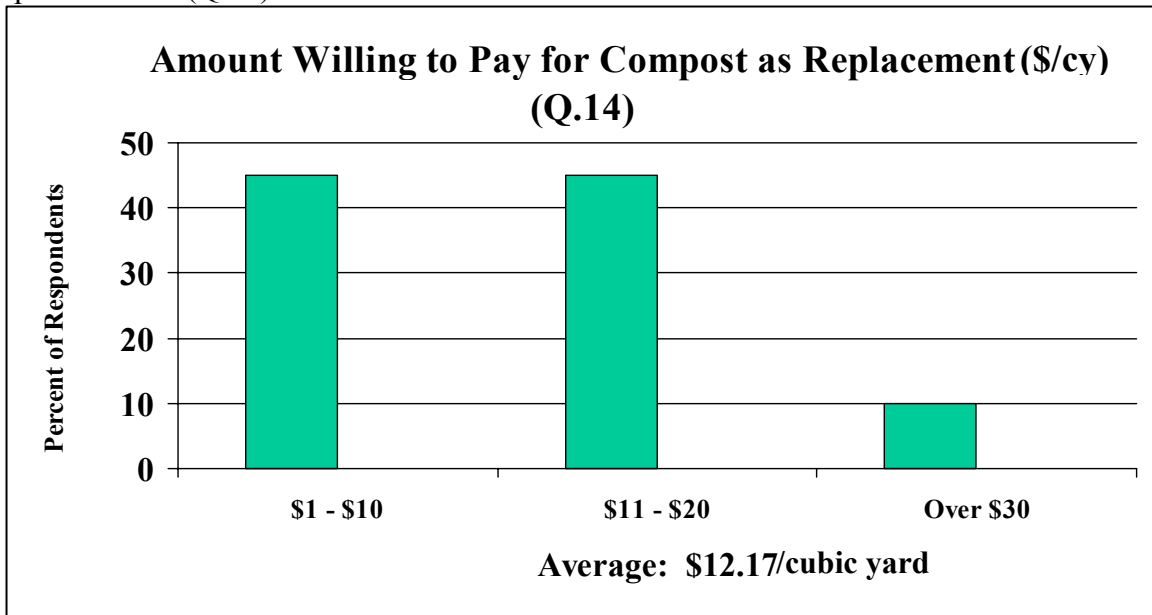


Written responses that explain respondent reluctance (“not willing to use” or “maybe”) to use compost fell into these four broad categories (not ranked in importance):

- Cost to purchase compost.
- Unsure about the availability of compost that meets their specifications in the local area.
- Do not know how to use compost.
- Not sure of the benefits of compost.

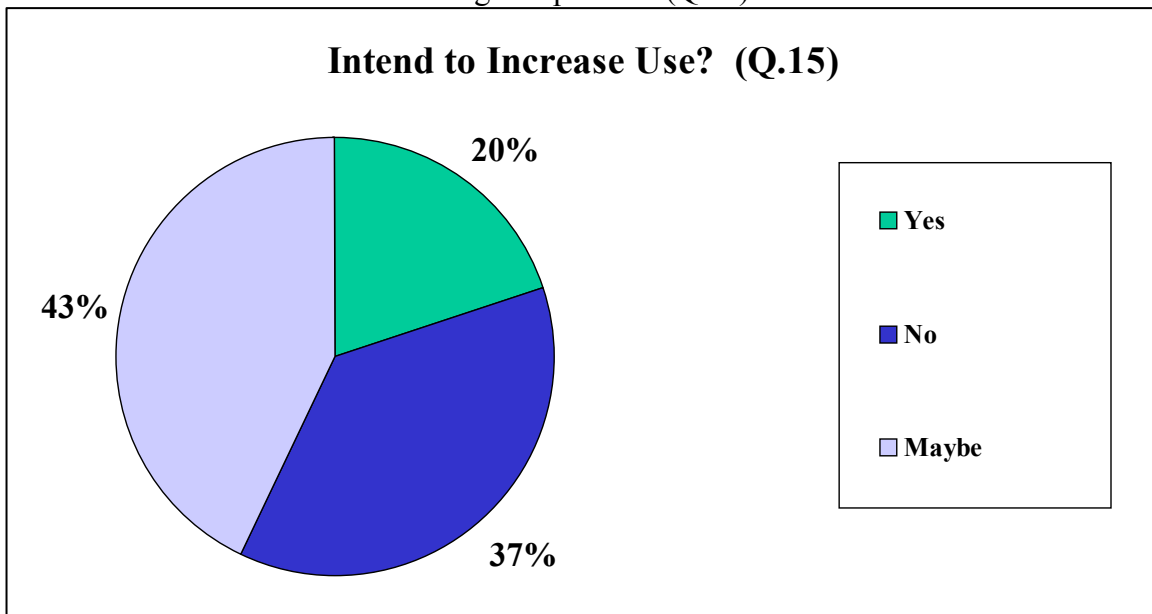
However, some growers expressed a willingness to do trials with compost in their own potting mixes to determine its value before using it on a large scale.

FIGURE 23. Amount respondents are willing to pay for compost that meet their specifications (Q.14).



Some one-fifth of nursery firms intend to increase their usage of compost. The balance are nearly equally split between a negative response and being undecided.

FIGURE 24. Intentions on increasing compost use (Q.15).



Those intending to increase use are more likely to be already familiar with composting. No other demographic or geographic measures distinguish this group.

Written reasons given by those who answered “no” or “maybe” to increasing compost use fell into the following four broad categories (listed in random order):

- As business grows, compost may be a product sold to consumers/depends on demand.

- Compost consistency must improve.
- Depends on the cost of compost.
- Depends on finding the right compost locally.

5.4.5 Significant Nursery Market Assessment Results

- 40 percent of respondents in this sector are in the Southeast/West Michigan areas (Regions 7 & 9).
- Only 20 percent of respondents mix their own potting soil.
- 60 percent are currently not using compost in their growing mixture.
- This sector has a generally positive opinion regarding the utility of compost.
- Nutrient availability, consistent product quality and pH were the most important attributes and grade and color the least important.
- Nearly 80 percent of respondents in this sector may be willing to use of compost.
- 55 percent are willing to pay between \$11 and \$30 per cubic yard for compost.
- 63 percent of respondents in this sector maybe willing to increase their use of compost in the future.

5.5. Agriculture Industry

5.5.1 Respondent Characteristics

The sampling frame for this segment of the study, using SIC/NAICS codes, was 9,215 farms. The list was modified to include certain specialty farms obtained from MSU Extension mailing lists on a replacement basis. The resulting universe count was thus maintained at 9,215 with the following composition of farms, distribution of outgoing questionnaires and returns as set forth in Table 5:

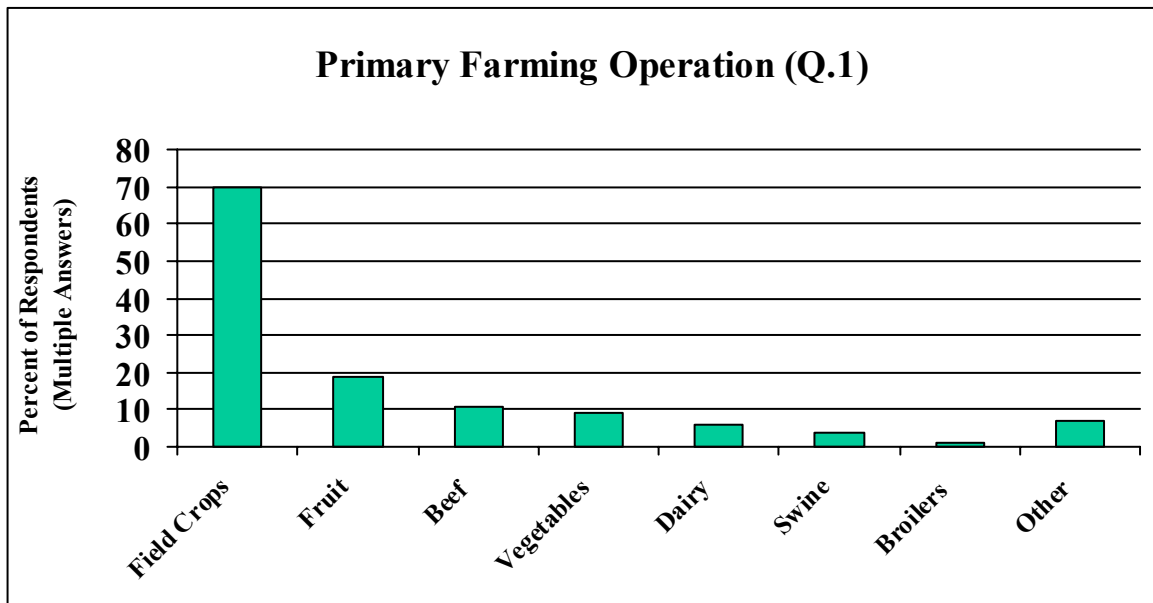
TABLE 5. Respondent characteristics.

Category	Universe	Number of Questionnaires Mailed	Questionnaires Returned	
			Number	Percent
Farms (from Dunn & Bradstreet list)	8,101	816	229	28%
Tree/Small Fruit	450	200	74	37%
Blueberry/Grape	421	169	64	38%
Vegetable	134	100	32	32%
Organic	109	109	38	35%
Total	9,215	1,394	437	31%

The survey database was weighted to adjust for population proportions. The data presentation in this report section uses the weighted data except where otherwise noted.

The farm types with the highest response rates represented were field crops (70%), fruit crops (19%) and beef (11%).

FIGURE 25. Respondent primary farming operation (Q.1).



Other classification information obtained includes the following:

- Average age: 55 years, with 66 percent over age 50.
- 93% are males.
- 88% are owners.
- 68% make the compost purchasing decisions.

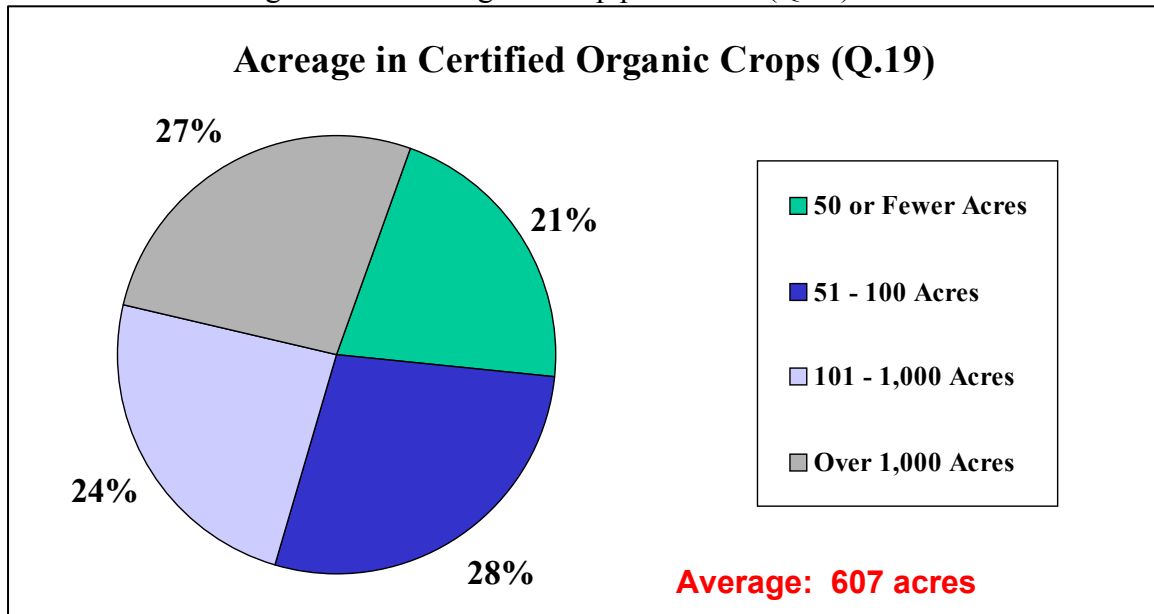
Major crop categories and the acres associated with each crop are as follows:

TABLE 6. Major crop categories and acreage.

Crop Category	Acres (Average)
Field Crops	189
Small Grains	161
Vegetables	141
Hay	104
Fruit	70
Pasture	38
Other	35
Overall Average	346

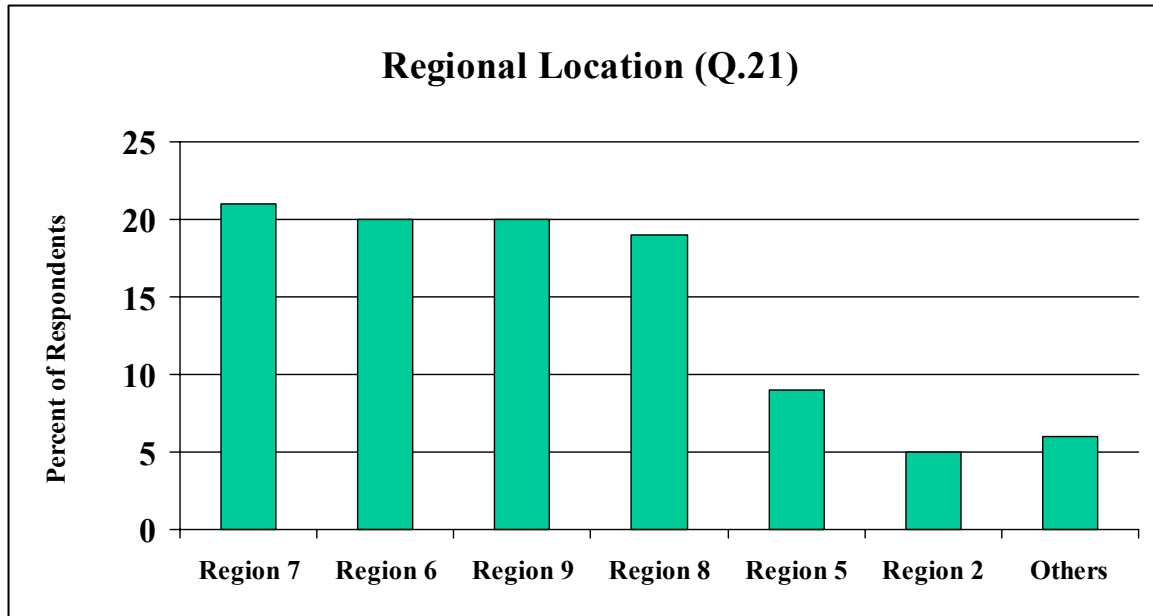
Forty-seven (47) farmers report they grow certified organic crops, with an average of 607 acres. The acreage that is certified is shown in the following graph. (This is un-weighted data.)

FIGURE 26. Acreage in certified organic crop production (Q.19).



Regions 6 (East Central), 7 (Southwest), 8 (South Central) and 9 (Southeast) together account for 80 percent of respondents.

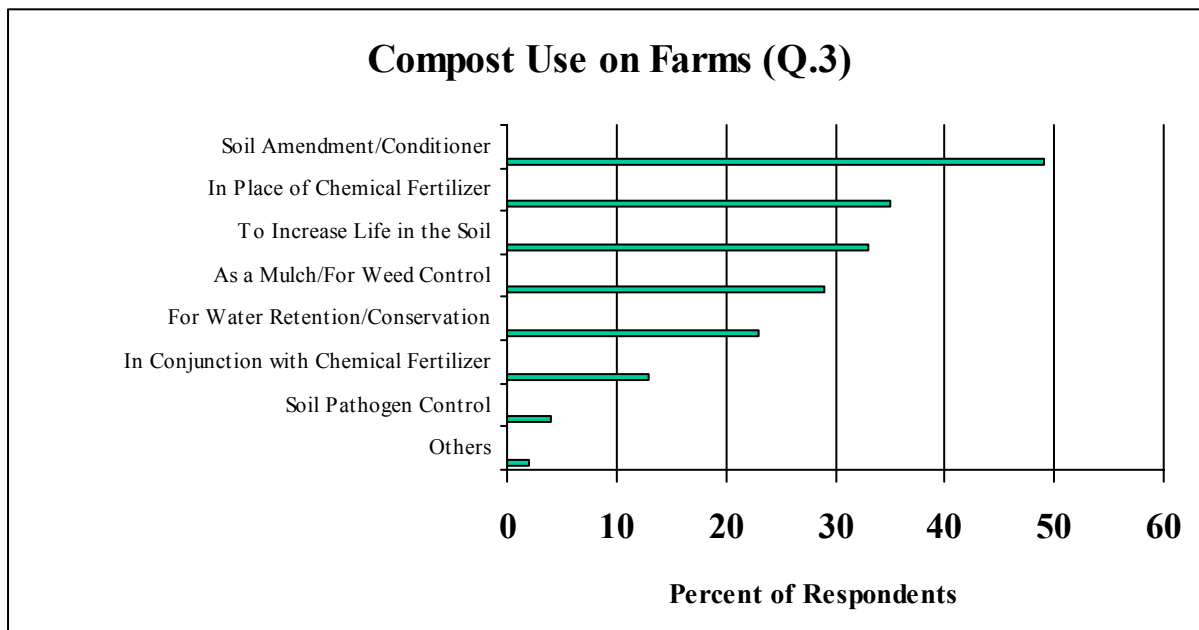
FIGURE 27. Regional locations of survey respondents (Q.21).



5.5.2 Compost Usage

Thirteen (13) percent of farmers currently use compost in their cropping systems. The most common use is as a soil amendment/conditioner, reported by nearly half of compost-using respondents.

FIGURE 28. Compost use on farms (Q.3).



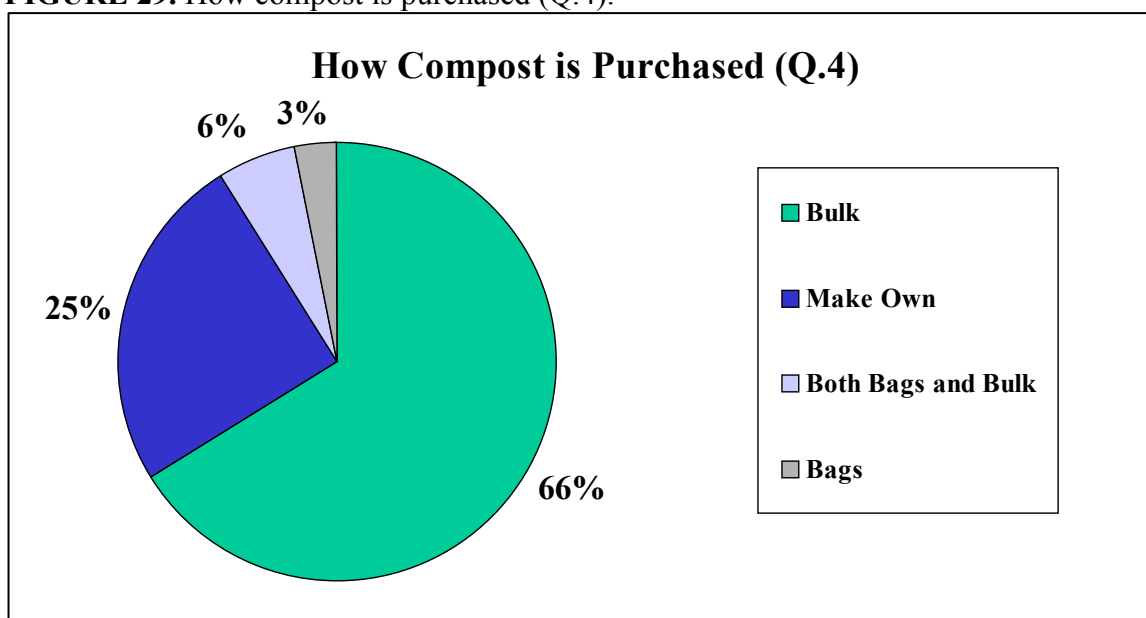
Additional uses, each reported by about one-third of respondents, include as a replacement for chemical fertilizer, to increase soil life and as a mulch or for weed control. About one-quarter indicated they use compost for water retention/conservation purposes while lesser proportions use it in conjunction with chemical fertilizers or as a soil pathogen control measure. No one reported using compost to buffer/control soil salts.

Farmers who grow field crops tend not to be compost users. Specialty farms, such as organic, tree/fruit, vegetable and blueberry/grape producers are disproportionately represented among compost users. Smaller farms are more likely to be compost users than are larger ones.

Compost-using farmers are, on average (slightly) younger and tend to be the compost purchasing decision-makers for the farm. Their farms are disproportionately represented in Region 2 (Northwest) and underrepresented in Region 6 (East Central).

The preferred form of compost delivery is bulk, which is preferred by two-thirds of respondents. One-quarter indicated they make their own compost instead of purchasing it. Six in ten compost-using respondents who purchase it would prefer to have it delivered and 40 percent would prefer to haul it themselves.

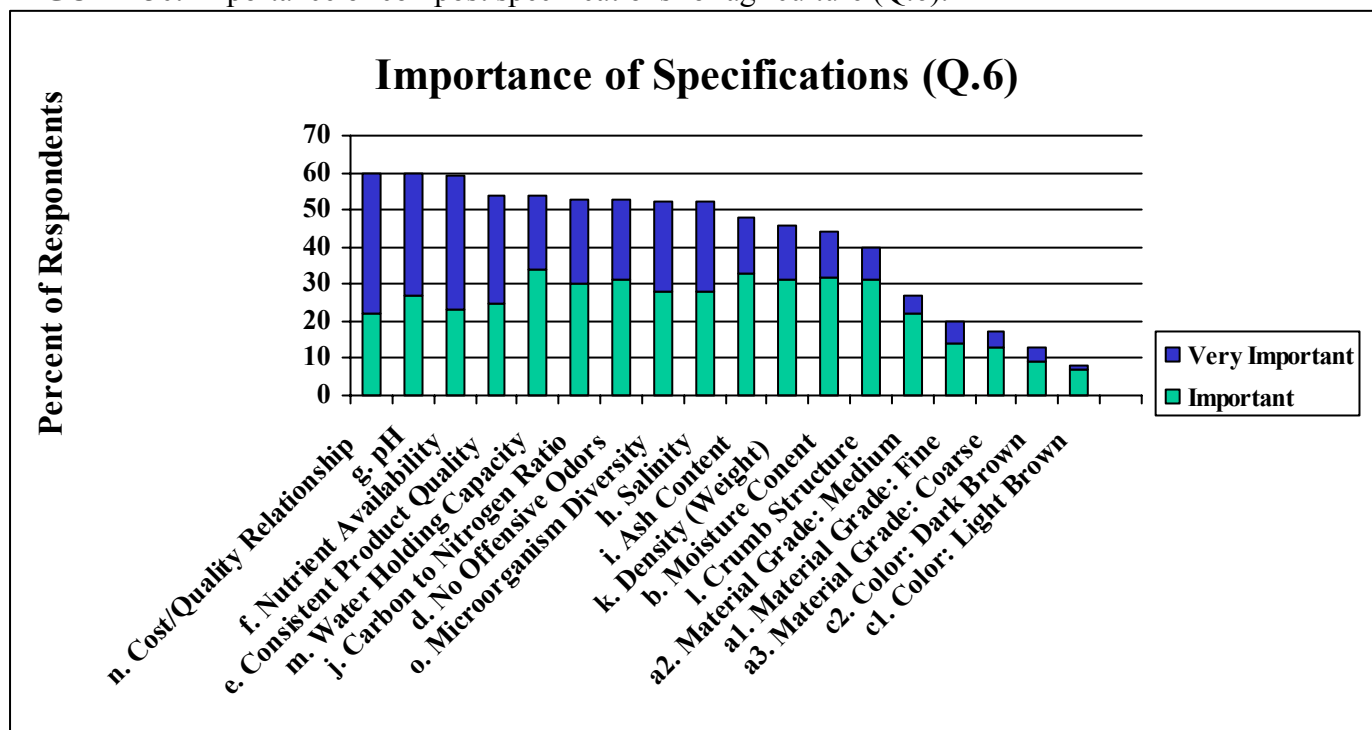
FIGURE 29. How compost is purchased (Q.4).



5.5.3 Product Adoption Issues

According to survey respondents, the five most important compost specifications are the cost/quality relationship, pH, nutrient availability, consistent product quality, and water holding capacity. This is consistent with the primary uses of compost identified earlier in the report. The least important specifications were related to compost color and grade. The graph below presents the specification elements in descending order of total importance with each bar segmented to show the percent saying “Important” and the percent saying “Very Important”.

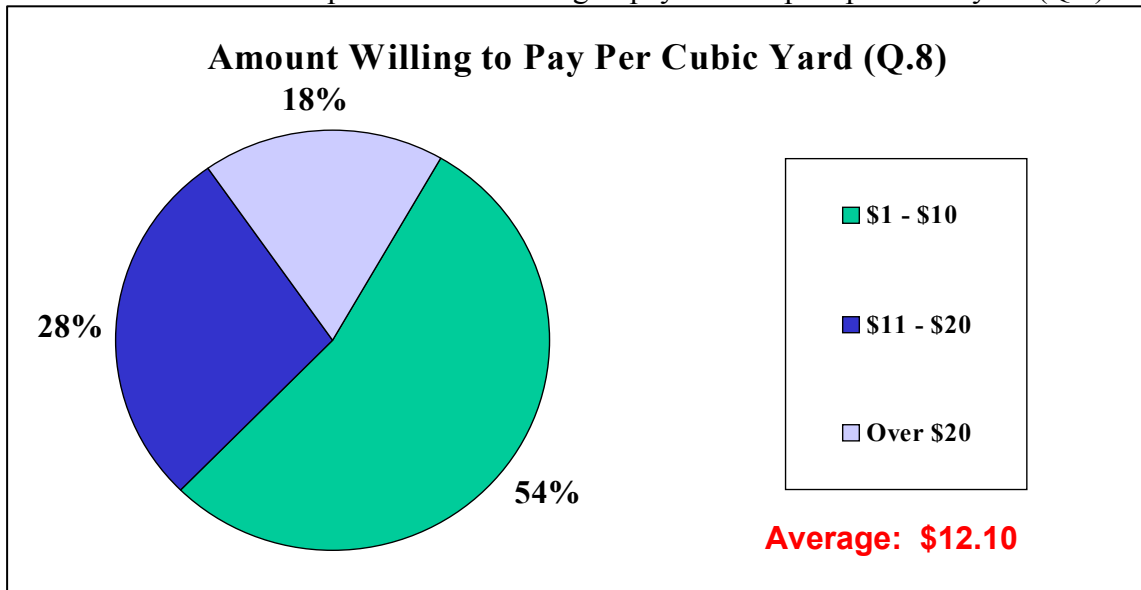
FIGURE 30. Importance of compost specifications for agriculture (Q.6).



Forty-four (44) percent of respondents indicated a willingness to use compost that met their specifications in place of or in addition to other organic materials. Respondents who indicated they might use compost wrote that the price of compost and the lack of experience in using compost were the primary reasons they were unsure about using compost.

On the average the price they would be willing to pay is \$12.10 per cubic yard.

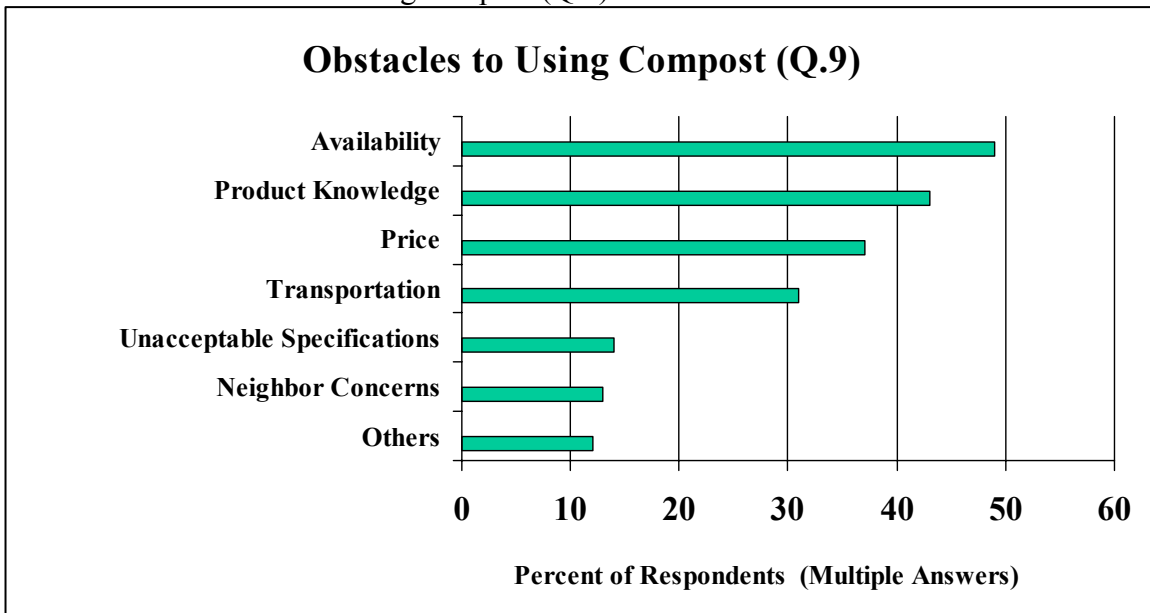
FIGURE 31. Amount respondents are willing to pay for compost per cubic yard (Q.8).



While many farmers who raise field crop show interest in using compost, the level of interest is disproportionately low. On the other hand, greater interest in using compost is reported by fruit crop producers. The interested ones are (slightly) younger and are the compost purchasing decision-makers for the farm. On this measure farm size is not a differentiating factor, nor is whether they produce organic crops. There are no significant geographic differentiators as well.

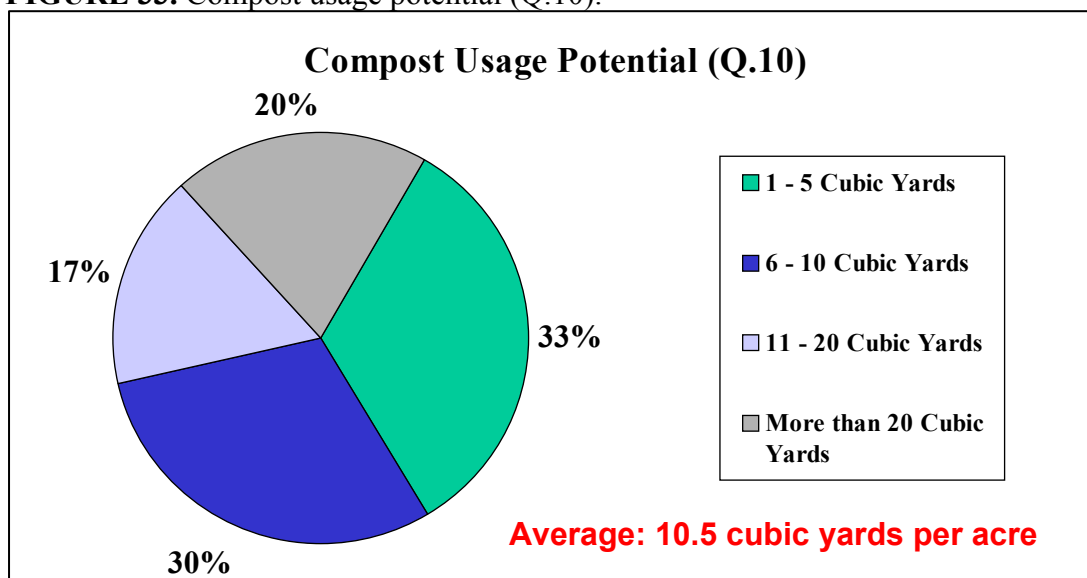
Product availability concerns lead the list of possible obstacles to using compost. This was reported by 49 percent of respondents. Next strongest obstacle is product knowledge concerns, reported by 43 percent. Price is a concern to 37 percent.

FIGURE 32. Obstacles to using compost (Q.9).



All respondents were asked to indicate the quantity of compost per acre they could potentially use. Of the 437 respondents, 189 reported a non-zero estimate, of which the average was 10.5 cubic yards. About one-third reported 1-5 cubic yards while 20 percent estimated a usage potential of more than 20 cubic yards per acre.

FIGURE 33. Compost usage potential (Q.10).



Seventeen (17) percent of the farmers participating in the study said they intend to increase their use of compost. Farmers who indicated they might increase their use of compost cited the following five general reasons:

- If they have more information on the benefits, use and production of compost.
- If a cheap source of compost is available close by.
- If it meets organic specifications.

The estimate of compost demand potential among farmers is estimated in the following way: 44 percent of 9,215 farms indicate interest. This equals 4,055 farms. Average farm size is 346 acres and average application rate is 10.5 cubic yards per acre. At a price of \$12.10 per cubic yard total market potential is calculated to be 178.3 million dollars.

Regardless of whether they currently use compost or not, all respondents were asked to react to a series of statements about composting. Their reactions are set forth in the following three categories:

Describe your business situation

When asked if they have organic wastes that really need to be recycled, 22% of the respondents indicated that they did. It should be noted that 41% of the respondents answered “not applicable” to that statement. Twenty-nine percent of the respondents are interested in composting their own waste materials on their own operation. Finally, 22% of the respondents have customers that are seeking a viable organic alternative to chemical-only treatments.

Describe your attitude toward compost

When asked if they valued the use of compost more highly than chemical soil additives, 39% of the respondents agreed with the statement. However, when asked if they supplement compost use with commercial fertilizers and/or soil amendments, 31% indicated they did. It should be noted that 35% of the respondents answered not applicable to the same statement.

Twenty-two percent of the respondents agreed that the use of compost has been more economical in the long run than other commercial fertilizers/soil amendments. When asked if compost is the primary soil amendment/source of nutrients used by the respondent, 14% agreed with the statement while 30% disagreed.

When asked if the quality of compost varies greatly enough that the respondent is reluctant to use it, 25% agreed with the statement while 27% disagreed. However, 38% of the respondent did say that they would be more inclined to use compost if quality standards did exist.

Thirty-four percent of the respondents produce compost for their own use. Twenty-four percent of the respondents agreed that the quality of compost they produce for their own use is satisfactory. However, 49% of the respondents felt they did not know much about the science of composting.

Describe your beliefs about the economics of making and using compost

Fifty-three percent of the respondents indicated they did not know much about the economics of composting. Four percent produce compost for sale and 23% sell compost made by others. Forty-three percent of the respondents agreed with the statement “producing compost for commercial sale is not currently economical for me”. When asked if producing compost for commercial sale is worth the time and money spent doing it, 12% percent of the respondents agreed. It should be noted that 36% of the respondents indicated “not applicable” to that statement. However, 32% of the respondents indicated they would consider producing compost for sale if the economic benefits could be clearly demonstrated to them.

When asked “producing compost for my own use is not currently economical for me”, 40% of the respondents agreed with the statement. Twenty-six percent of the respondents felt that “producing compost for their own use is worth the time and money spent doing it” while 21% disagreed. However, 56% of the respondents indicated they would consider using compost if the economic value of doing so could be clearly demonstrated to them.

5.5.4 Significant Agricultural Market Assessment Results

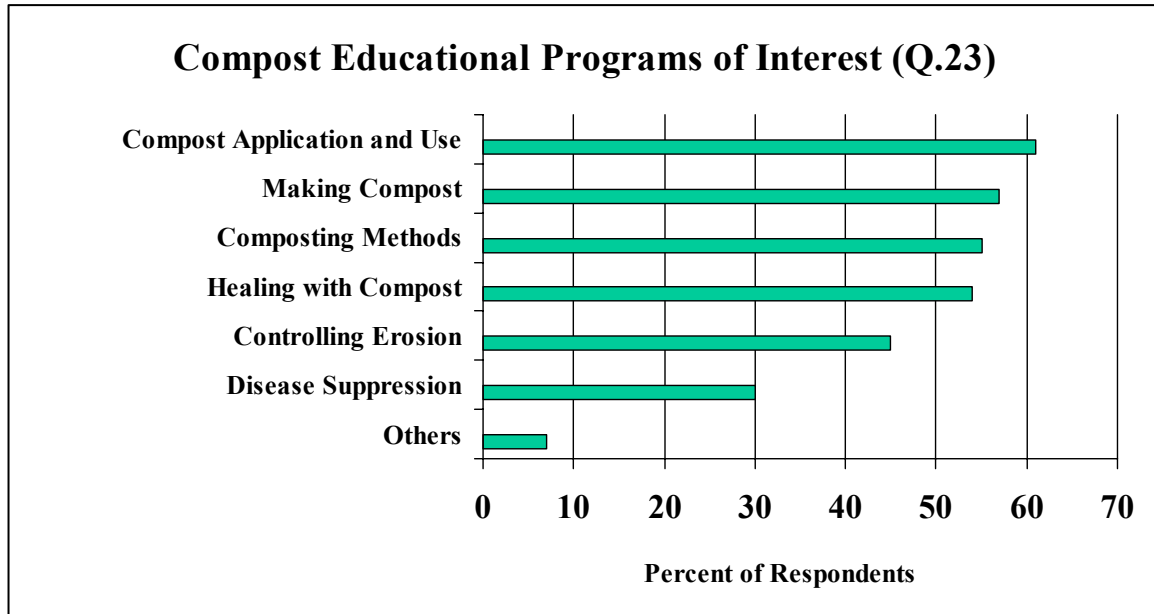
- 51 percent of organic farms that responded have between 100 and 1,000 acres under cultivation, going against the general belief that most organic farms are backyard operations.
- 42 percent of the respondents are from the Southwest/West Michigan areas (Regions 7 and 8).
- Only 25 percent in the agricultural sector make their own compost.
- Cost/quality relationship, pH and nutrient availability are the three most important qualities and grade and color are the least important.
- Only 18 percent are willing to pay over \$20 per cubic yard for compost.
- 48 percent said availability was the largest barrier to using more compost.
- There was generally a positive opinion from this sector on the utility of compost.
- 20 percent would use more than 20 cubic yards of compost per acre.

6. EDUCATIONAL OPPORTUNITIES IDENTIFIED FROM SURVEY RESULTS

6.1. Landscape

Several ideas for educational programs were tested with respondents. The one generating the greatest interest—to 61 percent—is compost application and use. Next was making compost, which appeals to 57 percent. Of the six specific programs tested, disease suppression was of least interest, appealing to only 30 percent of respondents.

FIGURE 34. Educational programs of interest to landscape professionals (Q.23).



Additional written responses are summarized as follows:

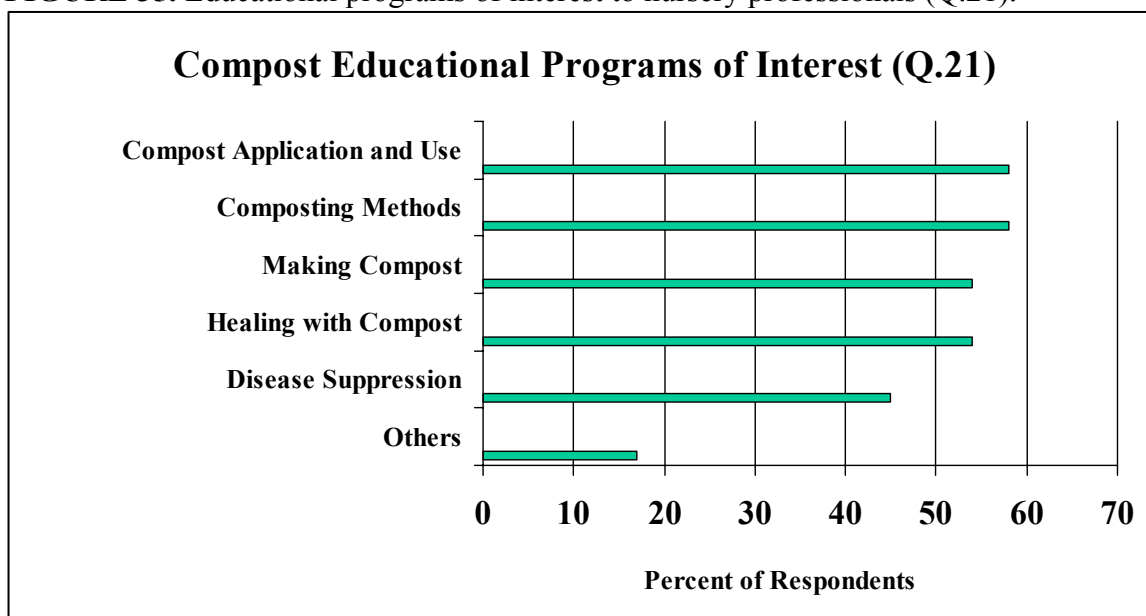
- I believe composted soils are preferable to screened peat/soil mixes. However, the composted soils I've tried have not been of consistent or known quality.
- Thatch management and compaction relief.
- Bio-treatment alternatives to charcoal, chemicals.
- Preventing rodents from burrowing in compost.
- Using all organic materials in compost (know the source i.e. no pesticides, herbicides, toxins).
- Make available research information on compost production.
- Use of compost in selling landscapes.
- Use of compost on environmental brownfield/cleaned up sites.

6.2. Nursery

Nearly equal proportions, about one-third, of survey respondents indicated interest in four compost educational programs. A slightly lower number indicated interest in disease suppression.

No interest was expressed in an educational program on controlling soil erosion with compost.

FIGURE 35. Educational programs of interest to nursery professionals (Q.21).



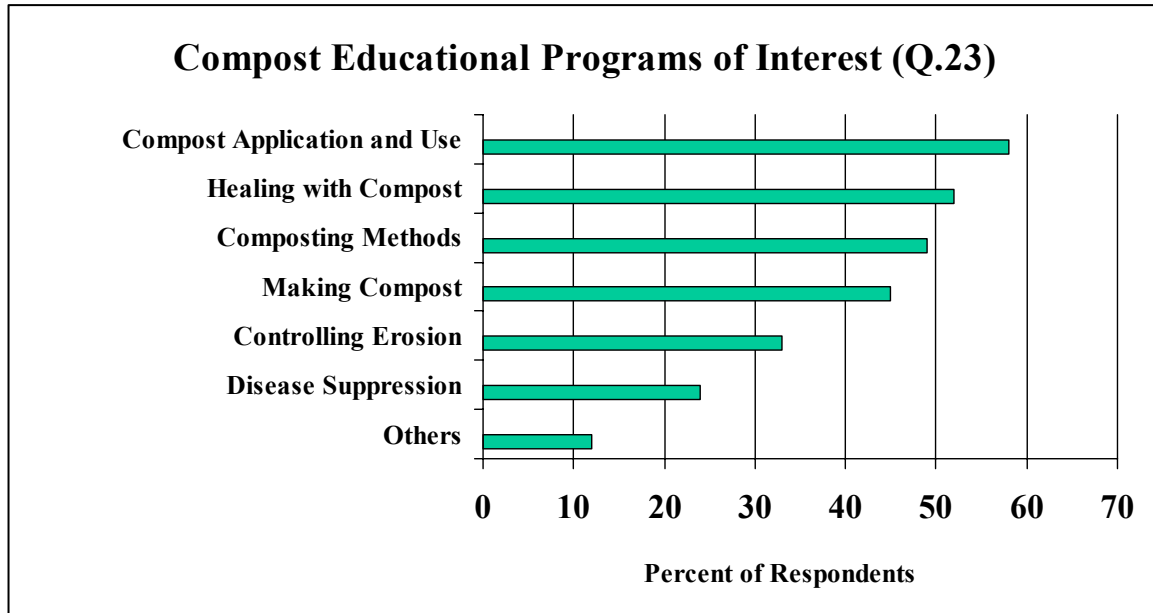
Additional written responses are summarized as follows:

- Concern about potential residue compounds from municipal compost.
- Want information on marketing compost.
- Controlling weed seeds and pathogens.
- Produce printed media rather than holding meetings.
- How to use commercially developed Mycorrhizal fungi.
- Using compost as an additive to topsoil for yards.
- Weed control.
- Use of compost in potting mixes.
- Making/marketing compost tea.
- Compost as a container media for commercial production.
- Using compost in plugs/transplants.

6.3 Agriculture

Compost application and use is the educational program of greatest interest, as reported by nearly six in ten responding farmers. Also of interest to a majority is healing soils with compost. Two other programs also generated significant levels of interest. They are composting methods—of interest to 49 percent of respondents—and making compost—45 percent. Programs of least interest are controlling erosion—33 percent—and disease suppression—24 percent.

FIGURE 36. Educational programs of interest to farmers (Q.23).



Additional written responses are summarized as follows:

- Compost use in growing crops (organic and conventional).
- Cost/benefit of using compost on crops.
- Insect control in crops with compost.
- Composting animal mortalities.
- Weed suppression/control.
- Knowledge of compost/composting.
- Compost use as it relates to other sustainable best management practices such as using cover crops for erosion control and nutrient retention (green manure).
- Economics of composting.
- Marketing compost.
- Safety and liability of a compost as it relates to potential contaminants (not knowing if a compost is agricultural or industrial).
- Moisture holding capacity of compost.
- Long-term benefits of using compost in a cropping system.
- Making compost tea.
- Using compost tea and/or humates—they would be easier to handle and apply than compost.

7. RESEARCH NEEDS IDENTIFIED FROM SURVEY RESULTS

Results from this compost marketing study show a significant potential demand for the Agricultural, Landscaping and Nursery sectors to accept compost as a wanted and viable method of nutrient and soil structure improvement. However, certain other information still needs to be obtained in order to accelerate the use of compost. The following areas of additional research are recommended to supplement the findings of this study:

- Identify and quantify the economic benefits of compost.
- Identify and quantify the long term effects of compost in a cropping system.
- Identify and quantify the benefits of compost tea for disease suppression in a cropping system.
- Identify and quantify the benefits of using compost for disease suppression and weed control in a cropping system.
- Identify and quantify the benefits of compost for insect control in a cropping system.
- Identify and quantify the benefits of using compost to remediate brownfield sites.
- Identify and quantify the benefits of using compost in a soilless media.
- Identify how to maximize the effectiveness of compost when used in concert with other Best Management Practices.
- Determine how compost and compost tea can be applied and used in a cropping system.

8. LITERATURE CITED

- Brodie, H.L., L.E. Carr and P. Condon. 2000. A Comparison of Static Pile and Turned Windrow Methods for Poultry Litter Compost Production. *Compost Science & Utilization*. Vol. 8, No. 3. pp. 178-189.
- Gould, M. Charles. 2002. Manure Management Systems Plan (MMSP) Survey Report. Unpublished manuscript in the possession of author (gouldm@msu.edu).
- Holtz, Brad. 2004. Regional Approach to Organic Residuals Recovery in Wisconsin. *BioCycle*. September 2004, pp. 58-62.
- Klewano, D.D. and V. Matthews. 2003. Michigan Agriculture Statistics 2002-2003. Michigan Department of Agriculture, Lansing, MI
- Knudsen, Mark. 2001. Ottawa County Planning and Grants Annual Report. West Olive, MI.
- Macatawa Watershed Project Description*. 1998.
(http://www.macatawa.org/~macc/Macatawa_Watershed/Watershedproject/Agriculture.htm)
- Michigan Commission of Agriculture. 2004. Generally Accepted Agricultural and Management Practices for Manure Management and Utilization. Michigan Department of Agriculture.
(http://www.michigan.gov/documents/MDA_manureRedlineStrikeout2003_67615_7.pdf)
- Michigan Right-to-Farm Program Fiscal Year Report*. 2004. Michigan Department of Agriculture, Environmental Stewardship Division,
(http://www.michigan.gov/documents/MDA_RTFFY04Annualreport_117010_7.pdf)
- United States Department of Agriculture National Agricultural Statistical Service (USDA-NASS), 2003
(www.nass.usda.gov)

9. APPENDICES

- 9.1 Landscape, Nursery and Agricultural Surveys and Cover Letters
- 9.2 List and map of counties by region

9.1 Landscape, Nursery and Agricultural Surveys and Cover Letters

Project Title: *Promoting Sustainable Agriculture through Identifying Markets for Compost Produced by Small to Mid-sized Farms in Michigan*

Dear Landscape Professional:

Enclosed is a compost market survey. The purposes of the survey are to determine the present use of compost and identify the needs of specific compost markets. The survey results will be used by Michigan farmers with small to mid-sized farms to manufacture compost specifically designed for those markets. Please provide the best information possible for each question.

There are three sections to the survey. Circle, check or write in the most correct answer for each question you answer. Please answer all questions as directed to in the survey. I recognize this is a very busy time of year, however filling out the survey should only take 5-8 minutes of your time.

*For the purposes of this survey, “**compost**” describes the end-product of the controlled biological decomposition of organic material by microorganisms to produce a high-quality product. It is not rotted, unmanaged organic matter.*

Enclosed is a self-addressed stamped envelope in which you can return the survey. Please return the completed survey by **Friday, June 18, 2004**. You will also find a dollar bill, which is yours regardless of whether you complete the survey or not. Don't spend it all at one place!

Survey results will be available by January 2005 and can be obtained by going to <http://web2.msue.msu.edu/compost> or by calling me and requesting a copy of it.

You may choose not to participate at all, only answer certain questions or discontinue your participation at any time without penalty or loss of benefits. You and/or your business will never be individually identified. Your privacy will be protected to the maximum extent of the law.

Questions regarding this study can be answered by contacting me at the address or phone number in the left margin of this letter. If you have questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Peter Vasilenko, Ph.D., Chair of the University Committee on Research Involving Human Subjects (UCRIHS) by phone: (517) 355-2180, fax: (517) 432-4503, e-mail: ucrihs@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

Your opinion is valued and a prompt response is appreciated. Please return the completed survey in the enclosed self-addressed stamped envelope by **Friday, June 18, 2004**. Completing and returning the survey indicates your voluntary agreement to participate in this project. Thank you for taking the time to complete this survey!

Sincerely,

M. Charles Gould
Agriculture & Natural Resources
Nutrient Management Agent

Comprehensive Compost Market Survey – Landscape Industry

Section I. Background Information

1. From the items listed below, make one choice (✓) that most closely describes the business or agency you are currently employed by.
 - ☐01 Landscape contractor - installation
 - ☐02 Landscape contractor – maintenance
 - ☐03 Wholesaler/Retailer of soil amendments
 - ☐04 Turfgrass grower
 - ☐05 Parks and recreation
 - ☐06 Sports turf (golf, stadiums, etc.)
 - ☐07 State, County, or Local Transportation Department
 - ☐08 State, County, or Local Natural Resource Department
 - ☐09 Excavating company
 - ☐10 Topsoil blender/manufacturer
 - ☐11 Bioremediation (environmental cleanup companies)
 - ☐98 Other (*Specify*) _____
2. Does your operation generate green waste (grass clippings, brush, etc)?
 - ☐1 Yes
 - ☐2 No (*If no, please skip to Question #9 below and continue filling out the survey*)
3. Please indicate the approximate annual quantity of green waste generated by your operation.
 - ☐1 0-520 cubic yards
 - ☐2 521-1,040 cubic yards
 - ☐3 1,041-2,600 cubic yards
 - ☐4 More than 2,600 cubic yards
4. How is your green waste presently disposed of? _____
5. What is the annual cost of disposing the green waste generated by your operation? \$ _____
6. What percent of your green waste do you compost? _____%
7. If you do not compost your green waste, briefly explain why? _____

8. How many cubic yards of compost do you generate annually from your green waste? _____
9. Do you use compost for any purpose during the growing season?
 - ☐1 Yes
 - ☐2 No (*If no, please skip to Question #15 on page 2 and continue filling out the survey*)
- 10a. What is the total volume of compost you use annually? _____ cubic yards
- 10b. In what form is it delivered to you?
 - ☐1 Bags
 - ☐2 Bulk

Section II. Compost Use

11. Where do you use compost? (**Check (✓) all that apply**)

A. Use as a soil amendment for planting/incorporation into the soil

New installation of:

- ☐1 Trees/shrubs
☐2 Planter beds
☐3 Turf/lawns

Maintenance of:

- ☐4 Trees/shrubs
☐5 Planter beds
☐6 Turf/lawns

B. Use as a mulch

New installation of:

- ☐1 Beds around trees
☐2 Planter beds (surface)
☐3 General yard mulch
☐4 Walkways
☐5 Control soil erosion

Maintenance of:

- ☐1 Beds around trees
☐2 Planter beds (surface)
☐3 General yard mulch
☐4 Walkways
☐5 Control soil erosion

C. Use to improve soil health and structure

- ☐1 Component of a topsoil mix
☐2 Improve poor and/or contaminated soils

12. When do you use the greatest quantity of compost?

- ☐1 Spring ☐2 Summer ☐3 Winter ☐4 Fall

13. Where do you purchase your compost? (**Please check (✓) all that apply**)

- ☐01 Wholesale
☐02 Retail
☐98 Other (**Specify**) _____

14. Do you intend to increase your use of compost?

- ☐1 Yes
☐2 No
☐3 Maybe (**Please briefly explain**) _____

Section III. Compost Specifications

15. Please check (✓) the importance of each specification listed below as it relates to your particular use of compost. If you are not currently using compost, please indicate the specifications that would be important to you if you were to use compost.

	<u>Not important</u>	<u>Important</u>	<u>Very important</u>
a. Material grade/size			
Fine – 1/8"	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Medium – 3/4"	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Coarse – 1"+	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
b. Moisture content	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
c. Color			
Light brown	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Dark brown	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
d. No offensive odors	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

(Question 15 is continued on the next

- | | | | |
|---|----------------------------|----------------------------|----------------------------|
| e. Consistent product quality | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| f. Nutrient availability | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| g. pH | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| h. Salinity | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| i. Ash content | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| j. Carbon to nitrogen ratio | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| k. Density (weight) | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| l. Crumb structure | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| m. Water holding capacity | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| n. Cost/quality relationship | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| o. Diversity of beneficial Microorganisms | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |
| p. Other (Specify) _____ | <input type="checkbox"/> 3 | <input type="checkbox"/> 2 | <input type="checkbox"/> 1 |

16. Would you be willing to use compost that met your specifications in place of or in addition to other organic materials that you use?

☐1 Yes

☐2 No

☐3 Maybe (**Please briefly explain**) _____

17. What price would you be willing to pay per cubic yard for compost that met your specifications?

☐1 \$1-\$10

☐4 \$31-\$40

☐2 \$11-\$20

☐5 \$41-\$50

☐3 \$21-\$30

☐6 More than \$51

18. Please check (✓) the box that most closely indicates your level of agreement with each statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
a. I have organic wastes which really need to be recycled	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
b. My customers are seeking a viable organic alternative to chemical-only treatments	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
c. I'm interested in composting my waste materials within my own operation	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
d. I don't really know much about the science of composting	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
e. The quality of compost varies greatly enough that I'm reluctant to use it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
f. If quality standards for compost existed, I'd be more inclined to use it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
g. The quality of compost I produce for my own use is satisfactory to me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
h. I have found the use of compost to be more economical in the long run than other commercial fertilizers/soil amendments	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
i. I value the use of compost more highly than chemical soil additives	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
j. I supplement my use of compost with commercial fertilizers and/or soil amendments	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
	Strongly			Strongly	Not

(Question 18 is continued on the next page)

<u>Applicable</u>	<u>Agree</u>	<u>Agree</u>	<u>Disagree</u>	<u>Disagree</u>	
k. Compost is the primary soil amendment/source of plant nutrients used by me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
l. I don't really know much about the economics of composting	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
m. Producing compost for my own use is not currently economical for me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
n. Producing compost for commercial sale is not currently economical for me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
o. Producing compost for my own use is worth the time and money spent doing it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
p. Producing compost for commercial sale is worth the time and money spent doing it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
q. I would consider using compost if the economic value of doing so could be clearly demonstrated to me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
r. I would consider producing compost for sale if the economic value of doing so could be clearly demonstrated to me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

Section III. Demographic Information

19. Your age is:

- | | |
|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> 1 25 or less | <input type="checkbox"/> 5 41-45 |
| <input type="checkbox"/> 2 26-30 | <input type="checkbox"/> 6 46-50 |
| <input type="checkbox"/> 3 31-35 | <input type="checkbox"/> 7 50 or more |
| <input type="checkbox"/> 4 36-40 | |

20. Your gender is:

- ☐1 Male
☐2 Female

21. Your position in the company is: **(Check (✓) all that apply)**

- ☐01 Owner
☐02 Manager
☐98 Other _____

22. Do you make the compost purchasing decisions?

- ☐1 Yes
☐2 No

23. What topic(s) for educational programs would be of most interest to you? **(Check (✓) all that apply)**

- ☐01 Fungal disease suppression with compost tea
☐02 Compost application and use
☐03 The art and science of making compost
☐04 Composting methods
☐05 Healing damaged soils with compost
☐06 Controlling soil erosion with compost
☐98 Other topic(s) _____

24. What county are you located in? _____

Project Title: *Promoting Sustainable Agriculture through Identifying Markets
for Compost Produced by Small to
Mid-sized Farms in Michigan*

Dear Greenhouse or Nursery Grower:

Enclosed is a compost market survey. The purposes of the survey are to determine the present use of compost and identify the needs of specific compost markets. The survey results will be used by Michigan farmers with small to mid-sized farms to manufacture compost specially designed for those markets. Please provide the best information possible for each question.

There are three sections to the survey. Circle, check or write in the most correct answer for each question you answer. Please answer all questions as directed to in the survey. I recognize this is a very busy time of year; however filling out the survey should only take 5-8 minutes of your time.

*For the purposes of this survey, “**compost**” describes the end-product of the controlled biological decomposition of organic material by microorganisms to produce a high-quality product. It is not rotted, unmanaged organic matter.*

Enclosed is a self-addressed stamped envelope in which you can return the survey. Please return the completed survey by **Friday, June 18, 2004**. You will also find a dollar bill, which is yours regardless of whether you complete the survey or not. Don't spend it all at one place!

Survey results will be available by January 2005 and can be obtained by going to <http://web2.msue.msu.edu/compost> or by calling me and requesting a copy of it.

You may choose not to participate at all, only answer certain questions or discontinue your participation at any time without penalty or loss of benefits. You and/or your business will never be individually identified. Your privacy will be protected to the maximum extent of the law.

Questions regarding this study can be answered by contacting me at the address or phone number in the left margin of this letter. If you have questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Peter Vasilenko, Ph.D., Chair of the University Committee on Research Involving Human Subjects (UCRIHS) by phone: (517) 355-2180, fax: (517) 432-4503, e-mail: ucrihs@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

Your opinion is valued and a prompt response would be appreciated. Please return the completed survey in the enclosed self-addressed stamped envelope by **Friday, June 18, 2004**. Completing and returning the survey indicates your voluntary agreement to participate in this project. Thank you for taking the time to complete this survey!

Sincerely,

M. Charles Gould
Agriculture & Natural Resources
Nutrient Management Agent

Section I. Background Information

1. Please check (✓) the box that categorizes your primary business.
 - ☐01 Retail nursery
 - ☐02 Retail nursery/landscaper
 - ☐03 Wholesale nursery
 - ☐04 Retail greenhouse/garden center
 - ☐05 Wholesale greenhouse
 - ☐98 Other (**Specify**) _____
2. Are you familiar with compost as a component of a growing substrate?
 - ☐1 Yes
 - ☐2 No
3. Do you purchase a premixed media or do you mix your own?
 - ☐1 Purchase a premixed media
 - ☐2 Mix your own media
4. Does your business generate green waste (plants, brush, etc)?
 - ☐1 Yes
 - ☐2 No (*If no, please go to Question #10 and continue filling out the survey*)
5. What is the estimated quantity of green waste generated by your business during a typical growing season?
 - ☐01 1-10 cubic yards/week
 - ☐02 11-20 cubic yards/week
 - ☐03 21-50 cubic yards/week
 - ☐04 More than 50 cubic yards/week
 - ☐98 Other (**Specify**) _____
6. How is your green waste presently disposed of?
 - ☐1 Piled somewhere on premise
 - ☐2 Other (**Specify**) _____
7. What is the annual cost of disposing the green waste generated by your business? \$ _____
8. What percent of your green waste do you compost? _____ %
9. If you do not compost your green waste, briefly explain why: _____
10. What percent of the components listed below are used in your growing mix?

a. Perlite _____ %	g. Hardwood bark _____ %
b. Peat _____ %	h. Rice hulls _____ %
c. Compost _____ %	i. Coir _____ %
d. Sand _____ %	j. Other (Specify) _____ %
e. Field soil _____ %	k. Doesn't apply to me _____ %
f. Pine bark _____ %	

11. Please check (✓) the box that most closely indicates your level of agreement with each statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
a. I have organic wastes which really need to be recycled	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
b. My customers are seeking a viable organic alternative to chemical-only treatments	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
c. I'm interested in composting my waste materials within my own operation	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
d. I don't really know much about the science of composting	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
e. The quality of compost varies greatly enough that I'm reluctant to use it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
f. If quality standards for compost existed, I'd be more inclined to use it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
g. The quality of compost I produce for my own use is satisfactory to me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
h. I have found the use of compost to be more economical in the long run than other commercial fertilizers/soil amendments	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
i. I value the use of compost more highly than chemical soil additives	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
j. I supplement my use of compost with commercial fertilizers and/or soil amendments	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
k. Compost is the primary soil amendment/source of plant nutrients used by me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
l. I don't really know much about the economics of composting	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
m. Producing compost for my own use is not currently economical for me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
n. Producing compost for commercial sale is not currently economical for me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
o. Producing compost for my own use is worth the time and money spent doing it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
p. Producing compost for commercial sale is worth the time and money spent doing it	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
q. I would consider using compost if the economic value of doing so could be clearly demonstrated to me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
r. I would consider producing compost for sale if the economic value of doing so could be clearly demonstrated to me	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
s. I produce compost for my own use	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
t. I produce compost for sale	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
u. I apply compost to my soil crop(s)	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
v. I use compost in my potting mixes	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
w. I sell compost which has been commercially prepared by others	<input type="checkbox"/> 5	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

Section II. Compost Specifications

12. Please indicate (✓) the importance of each specification listed below as it relates to your particular use of compost. If you are not currently using compost, please indicate the specifications that would be important to you if you were to use compost.

	<u>Not important</u>	<u>Important</u>	<u>Very important</u>
b. Material grade/size			
Fine – 1/8"	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Medium – 3/4"	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Coarse – 1"+	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
b. Moisture content	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
c. Color			
Light brown	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Dark brown	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
d. No offensive odors	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
e. Consistent product quality	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
f. Nutrient availability	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
q. pH	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
r. Salinity	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
s. Ash content	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
t. Carbon to nitrogen ratio	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
u. Density (weight)	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
v. Crumb structure	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
w. Water holding capacity	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
x. Cost/quality relationship	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
y. Diversity of beneficial			
Microorganisms	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
z. Other (<i>Specify</i>) _____	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

13. Would you be willing to use compost that met your specifications in place of or in addition to other organic materials that you use?

- ☐1 Yes
☐2 No
☐3 Maybe (***Please briefly explain***) _____

14. What price would you be willing to pay per cubic yard for compost that met your specifications?

- | | |
|---|---|
| <input type="checkbox"/> 1 \$1-\$10 cubic yard | <input type="checkbox"/> 4 \$31-\$40 |
| <input type="checkbox"/> 2 \$11-\$20 cubic yard | <input type="checkbox"/> 5 \$41-\$50 |
| <input type="checkbox"/> 3 \$21-\$30 cubic yard | <input type="checkbox"/> 6 More than \$51 |

15. Do you intend to increase your use of compost?

- ☐1 Yes
☐2 No
☐3 Maybe (***Please briefly explain***) _____

III. Demographic Information

16. Your age is:

- | | |
|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> 1 25 or less | <input type="checkbox"/> 5 41-45 |
| <input type="checkbox"/> 2 26-30 | <input type="checkbox"/> 6 46-50 |
| <input type="checkbox"/> 3 31-35 | <input type="checkbox"/> 7 50 or more |
| <input type="checkbox"/> 4 36-40 | |

17. Your gender is:

- ☐1 Male
☐2 Female

18. Your position in the company is: **(Check (✓) all that apply)**

- ☐01 Owner
☐02 Grower
☐03 Manager
☐98 Other _____

19. Do you make the growing media purchasing decision?

- ☐1 Yes
☐2 No

20. Total area in production:

- a. Greenhouse _____ square feet
b. Nursery _____ acres

21. What topic(s) for educational programs would be of most interest to you? **(Check (✓) all that apply)**

- ☐01 Fungal disease suppression with compost tea
☐02 Compost application and use
☐03 The art and science of making compost
☐04 Composting methods
☐05 Healing damaged soils with compost
☐98 Other topic(s) _____

22. What county are you located in? _____

Project Title: *Promoting Sustainable Agriculture through Identifying Markets for Compost Produced by Small to Mid-sized Farms in Michigan*

Dear Michigan Farmer:

Enclosed is a compost market survey. The purposes of the survey are to determine the present use of compost and identify the needs of specific compost markets. The survey results will be used by Michigan farmers with small to mid-sized farms to manufacture compost specially designed for those markets. Please provide the best information possible for each question.

There are three sections to the survey. Circle, check or write in the most correct answer for each question you answer. Please answer all questions as directed to in the survey. Filling out the survey should only take 5-8 minutes of your time.

For the purposes of this survey, “compost” describes the end-product of the controlled biological decomposition of organic material by microorganisms to produce a high-quality product. It is not rotted, unmanaged organic matter.

Enclosed is a self-addressed stamped envelope in which you can return the survey. Please return the completed survey by **Friday, June 18, 2004**. You will also find a dollar bill, which is yours regardless of whether you complete the survey or not. Don't spend it all at one place!

Survey results will be available by January 2005 and can be obtained by going to <http://web2.msue.msu.edu/compost> or by calling me and requesting a copy of it.

You may choose not to participate at all, only answer certain questions or discontinue your participation at any time without penalty or loss of benefits. You and/or your farm will never be individually identified. Your privacy will be protected to the maximum extent of the law.

Questions regarding this study can be answered by contacting me at the address or phone number in the left margin of this letter. If you have questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Peter Vasilenko, Ph.D., Chair of the University Committee on Research Involving Human Subjects (UCRIHS) by phone: (517) 355-2180, fax: (517) 432-4503, e-mail: ucrihs@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

I recognize this is a very busy time of year. Unfortunately I did not have control over the date this survey was released. Please take some time and complete the survey. Your opinion is valued and a prompt response would be appreciated. Return the completed survey in the enclosed self-addressed stamped envelope by **Friday, June 18, 2004**. Completing and returning the survey indicates your voluntary agreement to participate in this project. Thank you for taking the time to complete this survey!

Sincerely,

M. Charles Gould
Agriculture & Natural Resources
Nutrient Management Agent

Section I. Background Information

1. Please check (✓) your primary farming operation.

- ☐01 Dairy
- ☐02 Swine
- ☐03 Beef
- ☐04 Layers
- ☐05 Broilers
- ☐06 Turkey
- ☐07 Field crops
- ☐08 Vegetable crops
- ☐09 Fruit crops
- ☐98 Other (**Specify**) _____

2. Do you use compost as a soil amendment, mulch or for disease suppression in your cropping system?

- ☐1 Yes
- ☐2 No (*If no, please skip down to Question #6 on page 2 and continue filling out the survey*)

Section II. Compost Specifications

3. Check (✓) the two primary uses for compost application on your farm.

- | | |
|---|---|
| <input type="checkbox"/> 01 As a soil amendment/conditioner | <input type="checkbox"/> 06 In conjunction with chemical fertilizer |
| <input type="checkbox"/> 02 In place of chemical fertilizer | <input type="checkbox"/> 07 To increase life in the soil |
| <input type="checkbox"/> 03 As a mulch/for weed control | <input type="checkbox"/> 08 Soil pathogen control |
| <input type="checkbox"/> 04 Buffer/control soil salts | <input type="checkbox"/> 98 Other reason (Specify) _____ |
| <input type="checkbox"/> 05 For water retention/conservation absorption | |

4. How do you purchase compost?

- ☐1 In bags
- ☐2 In bulk
- ☐3 In both in bags and bulk

5. Would you want compost delivered or would you self-haul?

- ☐1 Delivered
- ☐2 Self-haul

6. Please indicate (✓) the importance of each specification listed below as it relates to your particular use of compost. If you are not currently using compost, please indicate the specifications that would be important to you if you were to use compost.

	<u>Not important</u>	<u>Important</u>	<u>Very important</u>
a. Material grade/size			
Fine – 1/8"	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Medium – 3/4"	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Coarse – 1"+	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
b. Moisture content	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
c. Color			
Light brown	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
Dark brown	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
d. No offensive odors	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
e. Consistent product quality	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
f. Nutrient availability	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
g. pH	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
h. Salinity	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
i. Ash content	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
j. Carbon to nitrogen ratio	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
k. Density (weight)	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
l. Crumb structure	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
m. Water holding capacity	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
n. Cost/quality relationship	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
o. Diversity of beneficial Microorganisms	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1
p. Other (<i>Specify</i>) _____	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1

7. Would you be willing to use compost that met your specifications in place of or in addition to other organic materials that you use?

☐1 Yes

☐2 No

☐3 Maybe (*Please briefly explain*) _____

8. What price would you be willing to pay per cubic yard for compost that met your specifications?

<input type="checkbox"/> 1 \$1-\$10	<input type="checkbox"/> 4 \$31-\$40
<input type="checkbox"/> 2 \$11-\$20	<input type="checkbox"/> 5 \$41-\$50
<input type="checkbox"/> 3 \$21-\$30	<input type="checkbox"/> 6 More than \$51

9. Are there factors that reduce/prevent your use of compost? (*Check (✓) all that apply*)

☐01 Availability

☐02 Product knowledge

☐03 Price

☐04 Transportation

☐05 Specifications do not meet my needs

☐06 Neighbor concerns

☐98 Other (*Specify*) _____

10. What quantity of compost could you potentially use per acre?

- ☐₁ 0 cubic yards ☐₄ 11-15 cubic yards
☐₂ 1-5 cubic yards ☐₅ 16-20 cubic yards
☐₃ 6-10 cubic yards ☐₆ More than 20 cubic yards

11. Do you intend to increase compost use on your farm?

- ☐₁ Yes
☐₂ No
☐₃ Maybe (**Please briefly explain**) _____

12. Please check (✓) the box that most closely indicates your level of agreement with each statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
a. I have organic wastes which really need to be recycled	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
b. My customers are seeking a viable organic alternative to chemical-only treatments	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
c. I'm interested in composting my waste materials within my own operation	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
d. I don't really know much about the science of composting	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
e. The quality of compost varies greatly enough that I'm reluctant to use it	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
f. If quality standards for compost existed, I'd be more inclined to use it	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
g. The quality of compost I produce for my own use is satisfactory to me	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
h. I have found the use of compost to be more economical in the long run than other commercial fertilizers/soil amendments	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
i. I value the use of compost more highly than chemical soil additives	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
j. I supplement my use of compost with commercial fertilizers and/or soil amendments	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
k. Compost is the primary soil amendment/source of plant nutrients used by me	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
l. I don't really know much about the economics of composting	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
m. Producing compost for my own use is not currently economical for me	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
n. Producing compost for commercial sale is not currently economical for me	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
o. Producing compost for my own use is worth the time and money spent doing it	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
p. Producing compost for commercial sale is worth the time and money spent doing it	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
q. I would consider using compost if the economic value of doing so could be clearly demonstrated to me	<input type="checkbox"/> ₅	<input type="checkbox"/> ₄	<input type="checkbox"/> ₃	<input type="checkbox"/> ₂	<input type="checkbox"/> ₁
r. I would consider producing compost for					

Question 12 is continued on the next page)

sale if the economic value of doing so
could be clearly demonstrated to me

☐5

☐4

☐3

☐2

☐1

Section III. Demographic Information

13. Your age is:

☐1 25 or less

☐2 26-30

☐3 31-35

☐4 36-40

☐5 41-45

☐6 46-50

☐7 50 or more

14. Your gender is:

☐1 Male

☐2 Female

15. Your position on the farm is _____

16. Do you make the compost purchasing decisions for the farm?

☐1 Yes

☐2 No

17. Please indicate the major crop(s) you grow and the acres associated with each crop.

Crop

Acres

a. _____

b. _____

c. _____

d. _____

18. Do you grow certified organic crops?

☐1 Yes

☐2 No

19. If you answered yes to question 18, how many total acres are certified organic? _____

20. What topic(s) for educational programs would be of most interest to you? **(Check (✓) all that apply)**

☐01 Suppressing fungal diseases with compost tea

☐02 Compost application and use

☐03 The art and science of making compost

☐04 Composting methods

☐05 Healing damaged soils with compost

☐06 Controlling soil erosion with compost

☐98 Other topic(s) _____

21. What county are you located in? _____

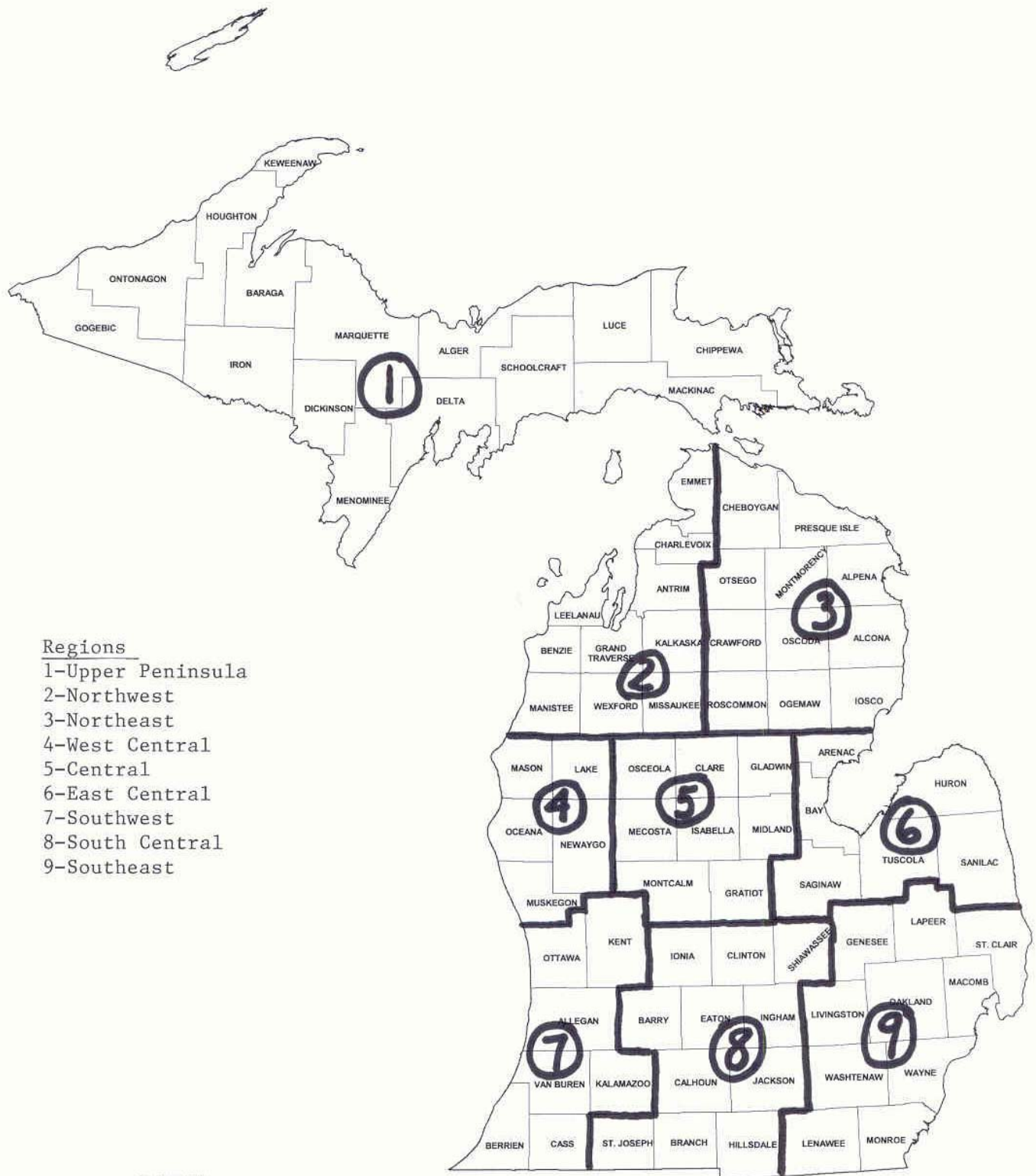
9.2 List and map of counties by region

COUNTIES BY REGION

County #	County	Region #
1	Alcona	3
2	Alger	1
3	Allegan	7
4	Alpena	3
5	Antrim	2
6	Arenac	6
7	Baraga	1
8	Barry	8
9	Bay	6
10	Benzie	2
11	Berrien	7
12	Branch	8
13	Calhoun	8
14	Cass	7
15	Charlevoix	2
16	Cheboygan	3
17	Chippewa	1
18	Clare	5
19	Clinton	8
20	Crawford	3
21	Delta	1
22	Dickinson	1
23	Eaton	8
24	Emmet	2
25	Genesee	9
26	Gladwin	5
27	Gogebic	1
28	Grand Traverse	2
29	Gratiot	5
30	Hillsdale	8
31	Houghton	1
32	Keweenaw	1
33	Huron	6
34	Ingham	8
35	Ionia	8
36	Iosco	3
37	Iron	1
38	Isabella	5
39	Jackson	8
40	Kalamazoo	7
41	Kalkaska	2
42	Kent	7
43	Lake	4
44	Lapeer	9
45	Leelanau	2
46	Lenawee	9

47	Livingston	9
48	Luce	1
49	Mackinac	1
50	Macomb	9
51	Manistee	2
52	Marquette	1
53	Mason	4
54	Mecosta	5
55	Menominee	1
56	Midland	5
57	Missaukee	2
58	Monroe	9
59	Montcalm	5
60	Montmorency	3
61	Muskegon	4
62	Newaygo	4
63	Oakland	9
64	Oceana	4
65	Ogemaw	3
66	Ontonagon	1
67	Osceola	5
68	Oscoda	3
69	Otsego	3
70	Ottawa	7
71	Presque Isle	3
72	Roscommon	3
73	Saginaw	6
74	Sanilac	6
75	Schoolcraft	1
76	Shiawassee	8
77	St. Clair	9
78	St. Joseph	8
79	Tuscola	6
80	Van Buren	7
81	Washtenaw	9
82	Wayne	9
83	Wexford	2

MICHIGAN COUNTIES



- Regions
- 1-Upper Peninsula
 - 2-Northwest
 - 3-Northeast
 - 4-West Central
 - 5-Central
 - 6-East Central
 - 7-Southwest
 - 8-South Central
 - 9-Southeast